NEW ZEALAND
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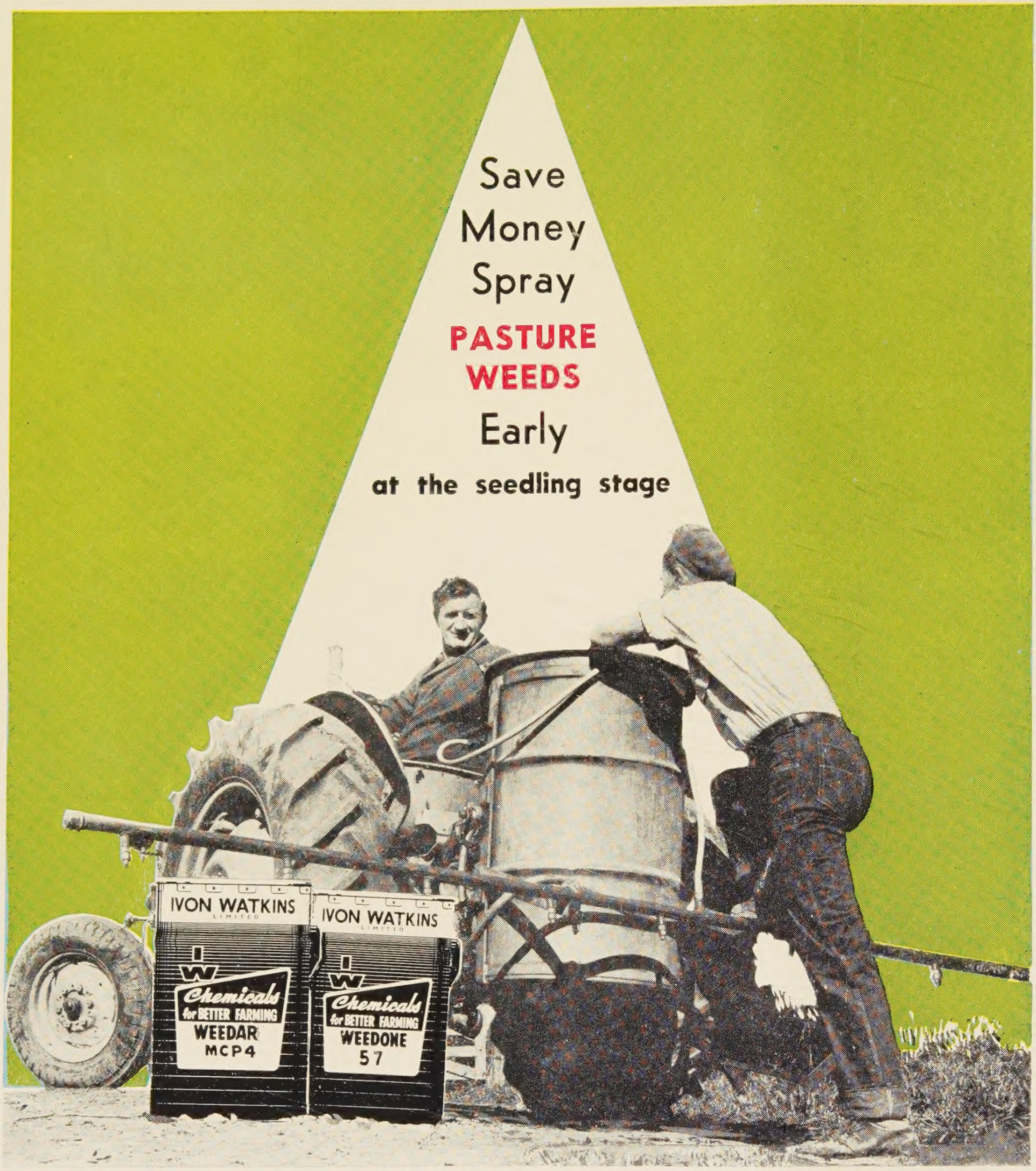
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Journal of Agriculture

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Freedom-from-Hunger—A World Challenge	B. R. Sen	202
FAO Seed Year 1961	P. W. Smallfield	203
Talking about Tupping	D. G. Edgar	209
Spectacular Increases in Japanese Livestock Industry		214
Bamboo Shelter Belts on Waikato Peat	J. C. Gerlach and H. A. Browning	215
Meteorological Records for July		216
Land Development Possibilities in Southland	G. J. Watt	217
Guides to Farm Management on Use of Insecticides on Pastures		228
Care of Livestock during October		230
Seasonal Notes		231
Domestic Beekeeping	G. L. Jeffery	233
Fourteenth Weed Control Conference		237
Dairy Produce Graded for Export		240
Radio Broadcasts		241

Vegetable Production:

Lettuces	A. G. Kennelly	243
October Work in the Home Garden	A. G. Kennelly	253
A. and P. Show Dates		255
Tussock Grassland Improvement by Grazing Management	J. M. Hercus	257
Johne's Disease of Sheep in South Canterbury	M. C. Armstrong	263
Maize Growing for Grain	H. de O. Chamberlain	269
Round the Research Stations		280
Town Supply Herds Certified Clear of Reactors to Tuberculin Test		283
The Business Side of Farming: Insurance	H. H. Tocker	285
Make Your Own Curtains	Eleanor Couston	290

The Flower Garden:

Plants for Shady Positions	J. P. Salinger	295
Garden Work in October	Joy Watkins	301
Make this Skirt from Your Old Coat	A. Gardner	304

Cover

What flavour do you prefer? Calves will have a lick at anything, especially fingers that they associate with a bucket of milk. As members of calf clubs many New Zealand farm children get valuable early training in how to rear and manage young dairy stock.

[*W. R. McLeod*

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Freedom-from-Hunger — A World Challenge

By B. R. SEN,
Director-General of the Food and Agriculture Organisation of United Nations

IN the long struggle to turn the world's natural resources to our advantage, mankind has known many triumphs. But the basic triumph still eludes us. We still have not conquered the hunger which continues to cast its shadow over the lives of millions of people in the poorer regions of the Near East, Africa, South America, and the Far East.

Statistics are fragmentary, but it seems that more than half of the world population of today is hungry, seriously underfed, or unable to get enough food of the right kind and quality for proper growth, for adequate resistance to disease, and for profitable labour. A disturbing feature of this situation is the slow tempo of agricultural and economic development in the regions where food deficiencies are most pronounced.

The whole problem becomes even more urgent when one realises that the world population is constantly growing at the rate of about fifty million a year, and is expected to double by the end of the century.

[*D.S.I.R.*

Mr Sen (left) visited New Zealand in March 1960 during a tour of FAO member countries to stimulate interest in the organisation's work. The Grasslands Division of the Department of Scientific and Industrial Research at Palmerston North was among the research institutions he visited, and he is seen above discussing the Division's work with the Director, Dr P. D. Sears.

Vast and Complex Problem

Obviously, the answer to such a vast and complex problem cannot be simple. The problem has to be attacked at all levels simultaneously and on a world-wide scale. It is a challenge to all governments and all people, to those who have not, as well as to those who have. A sharing of accumulated knowledge, technical resources, and acquired skill on a global basis is an essential pre-requisite for a coordinated approach, necessary to answer this challenge.

The last FAO Conference had this in mind when it took the historic decision to carry out a world-wide campaign for the eradication of hunger in all its manifest and hidden forms. On 1 July 1960 I had the honour, on behalf of the member nations of this Organisation, to launch the Freedom-from-Hunger Campaign.

I do not envisage this campaign as a special new programme in itself, because FAO during its span of nearly 15 years of existence has set under way numerous projects and plans for agricultural development in all parts of the world for the same purpose. In spite of progress made the attainment of reasonable levels of nutrition for the entire world population still seems to be a distant, if not a receding prospect. Therefore, this campaign seeks to encourage more drastic and accelerated action, not with the intention of replacing any programme at present under way, but to supplement and reinforce programmes of governments and international agencies, so that a better climate will be created and ensured for increased agricultural production in the needy countries themselves.

NEW ZEALAND is among the 77 Food and Agriculture Organisation member Governments and dependent territories who are taking part in the FAO World Seed Year during 1961. As a country already well developed in the field of seed production and certification and plant selection, breeding, and improvement, New Zealand's assistance is largely in the form of making accumulated knowledge and experience available through FAO to help less developed regions of the world.

The continuing importance of good seeds in any global programme to free the world from hunger is referred to by Mr B. R. Sen, Director-General of FAO, in his accompanying statement on FAO's Freedom-from-Hunger Campaign. The Seed Campaign part of the FAO plan is to continue beyond the World Seed Year as an integral part of FAO's much wider attack on hunger and malnutrition, and a World Seed Congress has been proposed by FAO for 1962 in Rome.

The important role of good seed in the development of New Zealand's agriculture is the theme of the next article in this issue, in which the Director-General of Agriculture, Mr P. W. Smallfield, reviews the development of seed certification and pasture and crop improvement and discusses New Zealand's part in FAO activities.

The campaign is intended to encourage the people of underfed countries to greater efforts for improving their lot. It is intended to raise a public awareness in the prosperous countries of the true dimensions of the problem of hunger and to enlist support and assistnace in all possible forms for its lasting removal from the human scene.

Helping Needy Countries to Help Themselves

The campaign does not aim at the temporary relief of hunger and malnutrition by dumping shipments of surplus food in the needy countries. However welcome these surpluses are in themselves, they can never provide a permanent solution. More and better food must be produced where it is most needed, and at a much faster rate than hitherto. In other words, the basis of the campaign is the helping of needy countries to help themselves.

Many education and information programmes are being planned to build up a better public understanding and to encourage support. Research programmes are being started to solve agricultural problems of specific nature in individual countries or regions. However, the heart of the campaign lies in the national action programmes.

Since seeds constitute the basis of production of all human foods and animal feeding stuffs of vegetable origin, it was most appropriate that FAO should have launched the World Seed Campaign three years before the larger Freedom-from-Hunger Campaign. The yields and qualities of all crops must, in the final analysis, be considered in relation to the initial starting point: the seed with its specific genetical composition and its capacity to produce a crop in the environments to which it is adapted.

Because the importance of good seeds is perennial in any global programme directed toward freeing the world from hunger, I have arranged for the Seed Campaign to continue after the World Seed Year, 1961, as an integral part of the Freedom-from-Hunger Campaign.

I wish to express my sincere thanks to all member governments and participating international and non-governmental organisations and agencies for their joint efforts in making this undertaking a success. I hope that, during the World Seed Year, all contributors and cooperators will continue to give their full support and assistance to this valuable project. Only through the cooperation and endeavours of all concerned will this action have a lasting and progressive effect.

FAO Seed Year 1961

By P. W. SMALLFIELD, Director-General of Agriculture

IN April 1957 the Director-General of FAO, Mr B. R. Sen, told member governments that, though the present level of scientific knowledge should enable the world's peoples to enjoy a much higher standard of life, the benefits from scientific advances accrue very slowly and make only limited impact on the majority of people. Surveying the means that could be adopted to expand agricultural production, the Director-General emphasised that improvement in seed quality was one of the most effective, but at the same time most inexpensive, methods of achieving this goal. A great deal had been accomplished in this field over the past 50 years, the most striking example being the evolution of hybrid maize, which had assumed such importance in the United States and had become increasingly significant in other countries. Mr Sen invited member governments to examine proposals for an international seed year so that at the 1959 Conference they could outline their plans if the 1957 Conference gave the idea general approval.

THE 1957 Conference adopted a resolution in favour of the proposal, the preamble to which stated the following reasons for the campaign: "The Conference, considering that the extensive use of high-quality seed of improved varieties is one of the most generally and most economically applicable measures for increasing productivity and improving the quantity of agricultural, horticultural, and forest products, decides to launch an international seed campaign and to designate, at its next session in 1959, the year 1960 or 1961 as the International FAO Seed Year".

During the 1959 Conference a large number of delegates gave details of the contribution their countries would be making and several indicated that they would be providing training courses in seed selection and multiplication. The decision taken in 1957 was endorsed and 1961 designated as the "World Seed Year". Member governments were asked to keep FAO informed of their activities so that a report might be presented to the 1961 Conference.

Importance of High-quality Strains and Varieties of Seeds

For many years the quality of seed was judged almost entirely by its freedom from impurities and by its germinating capacity and appearance. Though these characteristics are of some significance, they provide no guide to the type of plant the seed will produce.

During the last 30 years or so increasing attention has been paid to the recognition of the significance of variation within a species. The search for and testing of new species of pasture and crop plants have largely given way to improvement by selection and breeding within the species now in common use.

Recognition of the variation within a species has enabled plant breeders throughout the world to produce varieties or strains which, for specific conditions, are superior in characteristics such as yield, longevity, resistance to diseases and insect attack, and ability to respond adequately to increases in soil fertility.

In New Zealand increasing attention to the production of high-quality strains of pasture plants, cereals, and other farm crops has played an important part in land improvement generally.

The work of the plant breeder has contributed much to the continuing increase in livestock numbers through the provision of pastures which produce more, last longer, and provide a longer seasonal production.

The same applies to crop plants. As a result of the plant breeder's efforts there has been a marked increase in the quality of cereals, particularly in yield, grain quality, disease resistance, and ease of harvesting with modern machinery.

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Yield and resistance to disease and insect attack of feed crops such as rape, turnips, and swedes have also been improved. Continuing demand for the seed of varieties which in field trials and farmers' experience have proved superior shows that farmers recognise their value.

Development of Certified Seeds in New Zealand

During the early part of this century improved varieties of some crops and pasture plants were produced but failed to pass through the usual commercial channels into general use by farmers.

Much of this plant selection work was therefore lost because there was no sound step which enabled the farmer to buy seed of reputable origin.

Though the need for such a step was well recognised, the Government seed certification scheme was not introduced until the 1927-28 season. Its objective was to ensure that seed wheat could be bought with the assurance that the variety was reasonably pure and free from disease. A scheme for the certification of seed potatoes was also introduced.

While this scheme was being produced the strains of ryegrass in New Zealand were being evaluated and ryegrass was incorporated into the scheme for the 1929-30 harvest. Since then the seeds of many improved varieties of pasture and crop plants have been included. The scheme is still expanding and seed of any new variety of pasture or crop considered to be worthy of special recognition is included.

Of the total production of seed of certain species the following proportion is now estimated to be certified: Perennial ryegrass 75 per cent, Italian ryegrass 70 per cent, white clover over 90 per cent, cocksfoot 65 per cent, and Montgomery red clover 60 per cent. Much which is not certified is of certified origin. The seed certification scheme has had very great influence in eliminating seed of undesirable strains and replacing them with a comparatively small number of bred strains which have proved superior.

The New Zealand seed certification scheme is entirely voluntary and is not subject to any Act. Its success for over 30 years clearly indicates the justification for such a scheme in which the Department of Agriculture plays an important part between the producer and the consumer.

Most of the improved varieties of pasture and crop plants are produced by the Grasslands and Crop Research Divisions of the Department of Scientific and Industrial Research, which produce small quantities of seed to be handed over to the Farm Advisory Division of the Department of Agriculture, which contracts with selected farmers for its multiplication. When a reasonable amount of seed is available it is placed on the market through the usual commercial channels. This not only ensures that the varietal purity is maintained, but it also permits introduction into the scheme of improved varieties or strains as they become available from the plant breeder.

Pasture Seeds and Land Improvement since 1930

Though it was not recognised at the time, lack of superior strains of pasture plants for many years seriously limited the development of the pumice country and gumlands of the North Island. In spite of intensive preparatory cultivation, pastures reverted rapidly to low-producing grasses and clovers. Attention was given to selecting species of plants which would survive on the surface-sown grassland of the hills as well as on ploughable land. In the drier districts such as the Canterbury Plains pastures deteriorated rapidly and were usually ploughed up after three or four years or left to revert to low-producing pastures.

At the same time increasing attention was paid to the use of lime and phosphatic fertilisers, but responses to these were often not satisfactory.

In the early 1930s the availability of superior strains of pasture plants, particularly perennial ryegrass and white clover, changed the whole outlook on the development of "problem country". These plants were persistent and high producing, and the white clover was of a type that was able to take full advantage of phosphatic fertilisers. With the background knowledge of soil management gained over many years and the use of fertilisers and good seed, land development was at last able to proceed rapidly and with every assurance of success.

The pumice country, the gumlands, and the ironstone soils of the North Island were no longer major problems. On the rolling clay soils of the South Island progress was not as rapid, largely because difficulties with the establishment and maintenance of vigorous white clover persisted for many years. Not until the significance of molybdenum was determined were pastures on this country able to make real progress, which was later enhanced by the discovery of the value of sulphur.

On the dry plains land where white clover would not persist it was found that superior strains of the once-despised subterranean clover could be used to form the basis of good fattening pastures. Just as the use of a superior strain of white clover revolutionised land improvement in the higher-rainfall areas, so a superior strain of subterranean clover revolutionised land improvement in the low-rainfall areas.

In recent years aerial topdressing of surface-sown hill country has increased rapidly. Much of this country has also been oversown with seed of certified white clover, the introduction of which is essential if the greatest benefits from hill-country topdressing are to be obtained.

A comparatively new phase of land development is the surface sowing of tussock grasslands in the South Island. For many years there was little or no

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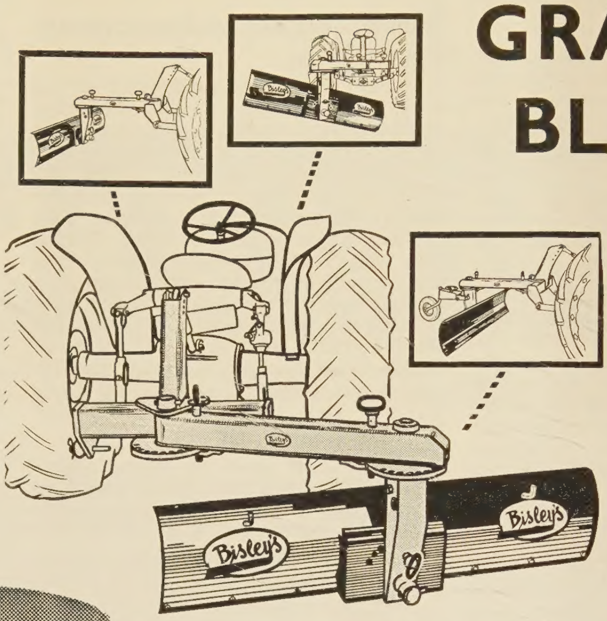

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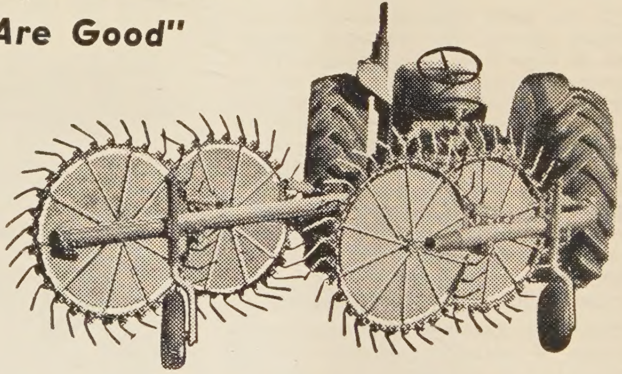

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improvement, and investigation, which was conducted chiefly in the depleted areas of inland Canterbury and Otago, aimed mainly at the introduction of grasses which would survive under the existing conditions of fertility. The fact that superior strains of pasture plants would thrive when introduced into this country if fertiliser was applied has been known for many years. Only during recent years, however, have the two main barriers to the improvement of this country been removed. The first was the incidence in many areas of rabbits, which rendered abortive any endeavours to improve. The second was the lack of the means of distributing both seed and fertiliser.

Reduction of the rabbit population, introduction of aerial distribution of fertilisers and seed, and discovery of the significance of sulphur in the growth of clover have brought a major change in the approach to the farming of some of the tussock grassland of the South Island.

With only limited areas of virgin land available, future land improvement can come only as the result of continuous coordination of the breeding and management of both plants and animals, associated with increasing study and appreciation of soil management and conservation of land already developed.

Annual Crops

Though New Zealand farming is based primarily on grassland, annual crops provide human foodstuffs and supplementary feed for livestock.

Maintenance and improvement of seed supplies are just as necessary for annual crops as for pastures.

Some of the most striking improvement work is that on wheat by the Wheat Research Institute and the Crop Research Division of the Department of Scientific and Industrial Research, which have produced a series of varieties that have almost completely replaced those grown 20 or 30 years ago. Particular attention has been paid to yield, quality, and resistance to lodging and disease.

Seed supplies of high-producing maize varieties are maintained by the Department of Agriculture, which imports hybrid seed to be increased under open pollination, and the resulting crop is distributed through seed merchants to farmers. New Zealand is largely self-supporting in seeds of brassica crops. The Crop Research Division has produced varieties of rape resistant to clubroot and to aphid attack, which have caused much loss in crops. Supplies of seed of improved varieties of turnips, kale, and chou moellier are available.

Potential for Improved Seed in Underdeveloped Countries

Many factors help to create the low level of agricultural productivity in underdeveloped countries. The complexity and magnitude of raising standards need repeated emphasis. Problems range from those characteristic of the densely settled river basins of east Asia to those of the sparsely populated areas of much of Africa and Latin America.

The diversity of conditions makes generalisations about the first steps toward improvement in productivity somewhat rash, but all countries and regions in this category suffer from what has been described as "the circle of poverty"; in other words, low initial productivity results in low incomes, leaving little for investment in any form of improvement and in time perpetuating existing conditions. Unsatisfactory forms of land tenure, unstable prices, and inefficient marketing systems all help to perpetuate this state of affairs.

Perhaps the greatest obstacle to any break in the circle is the ignorance and inertia which a system of near-subsistence agriculture almost inevitably produces among the peasant cultivators.

The type of programme envisaged in the FAO Seed Year does not require the very large capital outlay needed for a programme of land development; reforms in land tenure systems which are essential to sustained agricultural progress also require considerable changes in law and custom and so do not lead to any very rapid improvement in agricultural productivity.

The primary importance of a seed improvement programme as part of a general plan to raise agricultural productivity is emphasised in the FAO publication on the Mediterranean Development Project which states that "The increase in output required from Mediterranean agriculture cannot be achieved unless more widespread use is made of improved seeds and plants, and unless soils are improved so that the potentialities of better seeds and plants are exploited".

Most countries of the world, even where organisation of agricultural extension and research is most rudimentary, have created some form of organisation for improving seed quality. The principal weakness, however, is that the bulk of the seed used by peasant cultivators is never tested for purity or viability. The use of better-quality seed is continually increasing, but there are not enough men with training and experience to organise certification and multiplication. In east Asian countries attention has been concentrated on rice, but varieties of rice show little adaptability and the improved seed available from a Government seed farm may not be suited to the soil and climate in some other area.

Japan's development of improved varieties of rice indicates how the task can be tackled. When the first experimental station was established in Japan in 1890 rice yields were no higher than in other Asian countries. Japanese research workers have since evolved new high-yielding and disease-resistant varieties, varieties suited to a cooler climate, and varieties with a shorter growing period, an important consideration in an economy based on taking two or even three crops a year.

A major change in the approach to the farming of some tussock grassland in the South Island has resulted from the use of sulphur to promote clover growth, the aerial distribution of fertilisers and seed, and reduction of the rabbit population.

FAO SEED YEAR 1961 . . .

Japan's pure seed multiplication scheme has been in operation for many years and is based on the collaboration of village cooperatives, the prefectural governments, and the central Government. In recent years the average yield of rice in Japan has been from 70 to 80 bushels per acre, compared with 20 to 25 bushels in India, Pakistan, Burma, and Indonesia. In countries such as Laos or Nepal where agriculture is even more primitive the figures available suggest that yields are as low as 15 bushels per acre.

Even if allowance is made for the fact that more than half the nitrogenous fertiliser and more than three-quarters of the phosphatic and potassic fertiliser used in Asia are spread on Japanese farms, and that the varieties of rice used in the more temperate Japanese climate have a higher yield than those used in more humid tropical conditions, the gap between Japanese crop yields and those in other Asian countries remains very wide.

Nevertheless the work being done in other countries is expanding with the gradual increase in the number of research stations and the growing comprehensiveness of seed multiplication programmes. Much more work remains to be done in underdeveloped countries toward organising the use of better seed for vegetable and fodder crops where present standards are low.

FAO Plans for International Seed Year

In its plans for the International Seed Year FAO has stressed that member governments should conduct their campaigns according to their own ideas of what is appropriate. They will have to take account in their planning of the type of agriculture and agricultural organisations, the level of economic development, and the organisation of the seed trade. To assist the campaign FAO has promised to provide advice and assistance in specific projects and the means to facilitate cooperation with international bodies having an interest in seed improvement. It will also distribute technical publications and publish articles and news.

At the inception of the campaign the Director-General of FAO suggested to member governments that national seed campaign committees would provide the most effective means of promoting the campaign by encouraging work in progress or in preparation on plant breeding, plant introduction, and plant ecology, beside other scientific investigations, by expanding work on seed selection and multiplication, and by educational programmes to create keener appreciation of the importance of seed quality.

N.Z.'s Contribution to International Seed Year

From the inception of the FAO scheme New Zealand has endorsed its aims. The New Zealand delegate to the 1959 FAO Conference promised full cooperation, even though it has not been considered necessary to establish any special machinery, as there is already very active interest in agricultural seeds in New Zealand and widespread awareness of their importance in improving standards of agricultural productivity. It has been agreed, however, that the existing Small Seeds Advisory Committee, comprising representatives of farmers, merchants, and the Department of Agriculture and presided over by the Chief Advisory Officer (Agronomy), which advises the Department on the seed industry, can undertake work for the campaign.

New Zealand has also offered to provide training courses in the organisation of seed certification and in technical problems associated with it through existing schemes for international aid in which we participate, the Colombo Plan and Expanded Technical Assistance Programme. A considerable quantity of technical literature, photographs, and filmstrips have been supplied to FAO and regular information about the campaign is being published.

New Zealand has always stressed, however, that progress in the production and use of better-quality seed depends very largely on efficient advisory and technical services, without which most farmers will not be fully aware of the need for better-quality seed, nor will they be brought in contact with the organisation of improvement work.

Dairy Board Visit to Ruakura

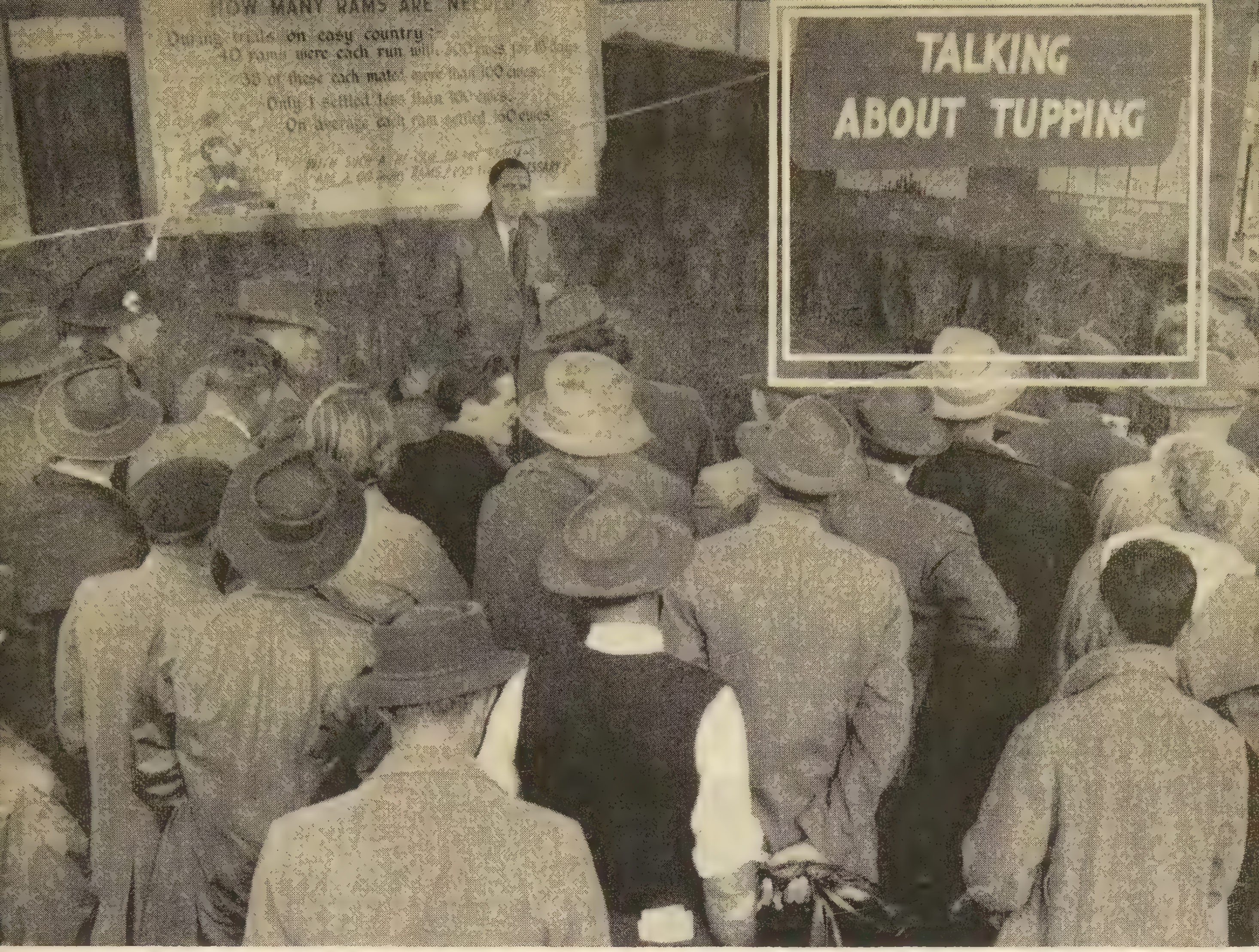
MEMBERS of the New Zealand Dairy Board accepted in early July a long-standing invitation from the Director of the Department of Agriculture's Ruakura Animal Research Station, Dr C. P. McMeekan, to visit the Station and inspect the research projects and hear of current and planned programmes.

To fit in with the Ruakura visit the Board held a special meeting in the offices of the N.Z. Coop. Dairy Co. in Hamilton, and members also visited the Board's Artificial Breeding Centre at Newstead, near Ruakura.

Illustrated above is discussion with Dr McMeekan of current and projected inquiry into grazing management of dairy cows at Ruakura's No. 2 Dairy, where in 15 years six major cattle studies with differences in stocking rate as the major or only variable have been completed.

Along the rail, from left, are Mr F. L. Onion, Dr McMeekan, Mr D. A. Finlayson, Mr A. Linton (chairman), Mr H. A. Foy; and, visible in the background, Mr P. S. Green, Mr A. L. Friis, Mr J. S. Hickey, and Mr C. W. Burnard.

In comparisons of butterfat production under high and low stocking rates with controlled and uncontrolled grazing at No. 2 Dairy, the high rate controlled farm, carrying 42 milking cows on 33½ acres, has been the highest producing of the four systems over the past four years, its output averaging 485 lb of fat per acre.


HOW MANY RAMS ARE NEEDED?
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TALKING ABOUT TUPPING

TALKING about tupping . . .

What proportion of rams is needed?

- On many farms fewer rams can be used if their fertility is established by prior semen examination.

When should the rams be joined with the ewes?

- If a change from the usual time of joining the rams is considered, the choice lies between advancing and concentrating lambing by putting rams out earlier, or increasing lambing percentage by turning them out later.

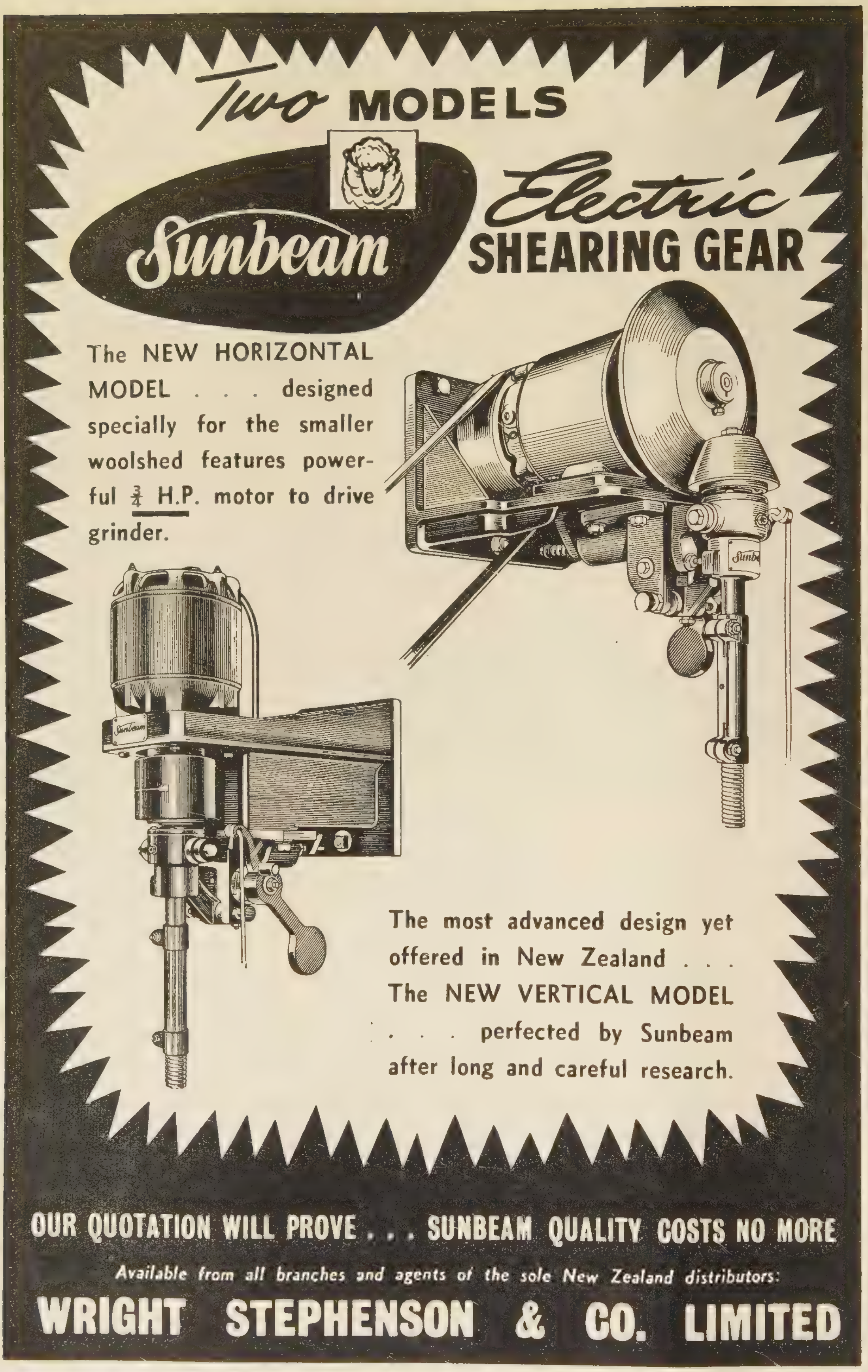
These general conclusions from experimental work at Ruakura and elsewhere were presented in a paper to this year's Ruakura Farmers' Conference by D. G. EDGAR, Veterinary Research Officer, Department of Agriculture's Ruakura Animal Research Station. An adaptation of the paper is given here.

THE practice of joining the rams with the ewes at the beginning of the breeding season is largely traditional. Only recently has experimental work been done on ram fertility, the necessary proportion of rams to put with the ewes, and the effect of the time of joining the rams and ewes on fertility and on the onset of the breeding season.

RAM FERTILITY

In a study of 296 stud rams on properties in the Waikato, Manawatu, and Wanganui districts, about 5 per cent of the rams were found to be infertile and left less than one-third of their ewes in lamb.

Since in stud flocks infertile rams reveal themselves and are not retained, this percentage is probably lower than holds throughout the industry, where the proportion might be in the region of 10 per cent, which is considered to be the proportion of infertile bulls in the dairy industry.



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⮝ Management at tupping can have a big influence on lambing percentage. Important factors are ram fertility, the proportion of rams to put with the ewes, and the time of joining rams and ewes.

The proportion of infertile rams is relatively low, so that where several rams are working together the fertile rams mostly compensate for the infertile and the proportion of dry ewes is not affected.

Significant Ifs

Circumstances in which infertile rams could reduce lambing percentages are:

If the proportion of 5 to 10 per cent of infertile rams is exceeded, there may be too few fertile rams to compensate for the infertile. Low lambing percentages on some farms in the Waikato have been traced to a high proportion of infertile rams.

If the boss ram is infertile and prevents fertile rams from serving ewes.

If the property is in broken country or if paddocks are large, individual rams tend to collect a harem of ewes. One infertile ram might then be responsible for 60 dry ewes.

If the proportion of rams to ewes is low (1 per cent or less). The lower the proportion of rams used the more important it becomes that they should be fertile.

In the study of 296 stud rams semen was collected by electrical stimulation, a method easy to use and not severe on the rams. The rams were each examined three times and the fertile rams gave satisfactory samples at 85 per cent of tests, whereas infertile rams gave no satisfactory sample.

Therefore, a ram may be passed as fertile when he gives one satisfactory sample, and only those which give an unsatisfactory sample need be re-examined.

The infertile rams are in the second group and a further examination may be considered warranted only with special rams.

Rams could be sold with a veterinary certificate to show that a satisfactory semen sample has been obtained, thus giving buyers a greater assurance of their ability.

PROPORTION OF RAMS

Mr K. Haughey of the Ashburton Veterinary Club and cooperative farmers in that area have provided much needed information on the proportion of rams needed.

During two seasons 40 rams, ranging from two-tooths to six-year-olds, were each run with about 300 ewes for 18 days at the beginning of the breeding season. The trials were on easy country, the ewes were all older than two-tooths, and a satisfactory semen sample was collected from each ram by electrical stimulation before joining the ewes.

In two cases fewer than 100 ewes were mated in the 18 days, as the flock had not fully entered the breeding season.

Of the other 38 rams each mated with more than 100 ewes in the 18 days one settled more than 250 ewes, only one settled fewer than 100 ewes, and the average for the group was 160 ewes settled in 18 days.

Five of the rams were not replaced at the end of the 18 days, and each settled his group of 300 ewes as successfully as if the more usual six rams per 300 ewes had been used.

All rams appeared in good condition at the end of the experiment. No energy had been used in fighting other rams.

On these figures it might be foolhardy to advocate running one ram to 300 ewes, but providing the rams are fertile, the country easy, and the ewes older than two-tooths, two rams per 100 ewes is probably at least twice what is needed.

JOINING THE RAMS WITH THE EWES

Effect of Time of Joining on Fertility

It has been known for some years, from studies on slaughtered ewes in England, that ovulation rate goes up during the early part of the breeding season. More recently in several studies in New Zealand, where *corpora lutea* in the ovaries of slaughtered ewes have been counted, it has been similarly shown that the number of eggs shed per heat, and consequently the potential rate of multiple births, increases during the first eight weeks of the breeding season.

Theoretically, therefore, turning the rams out with the ewes later than

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usual, when the breeding season is some weeks advanced, should increase the proportion of multiple births. Since not all ewes begin their breeding season at the same time, the practice could not be precisely applied, as some ewes may be in their third oestrous cycle while others are in their first.

Mr Haughey has quoted lambing figures from Ashburton County which suggest that the theory works in the field.

LAMBS BORN PER 100 EWES LAMBING, COMPARED WITH DATE OF JOINING RAMS

Rams joined ..	5 to 25 March	27 March to 18 April
Lambs per 100 ewes lambing ..	131	149

Turning out the rams on average about three and a half weeks later has increased the number of multiple births. It appears not to affect the proportion of dry ewes. Factors adversely affecting fertility are apparently as effective against two eggs as against one in the same ewe.

Mr Haughey suggests that differences in the time of joining rams may explain much of the difference in fertility between North and South Island ewe flocks.

Romney ewes reach their peak of egg production in early April, and rams should be turned out after that to gain the maximum effect.

A delay in turning out the rams means a delay in lambing. This may fit less well with the period of maximum pasture growth and lead to difficulties in fattening lambs.

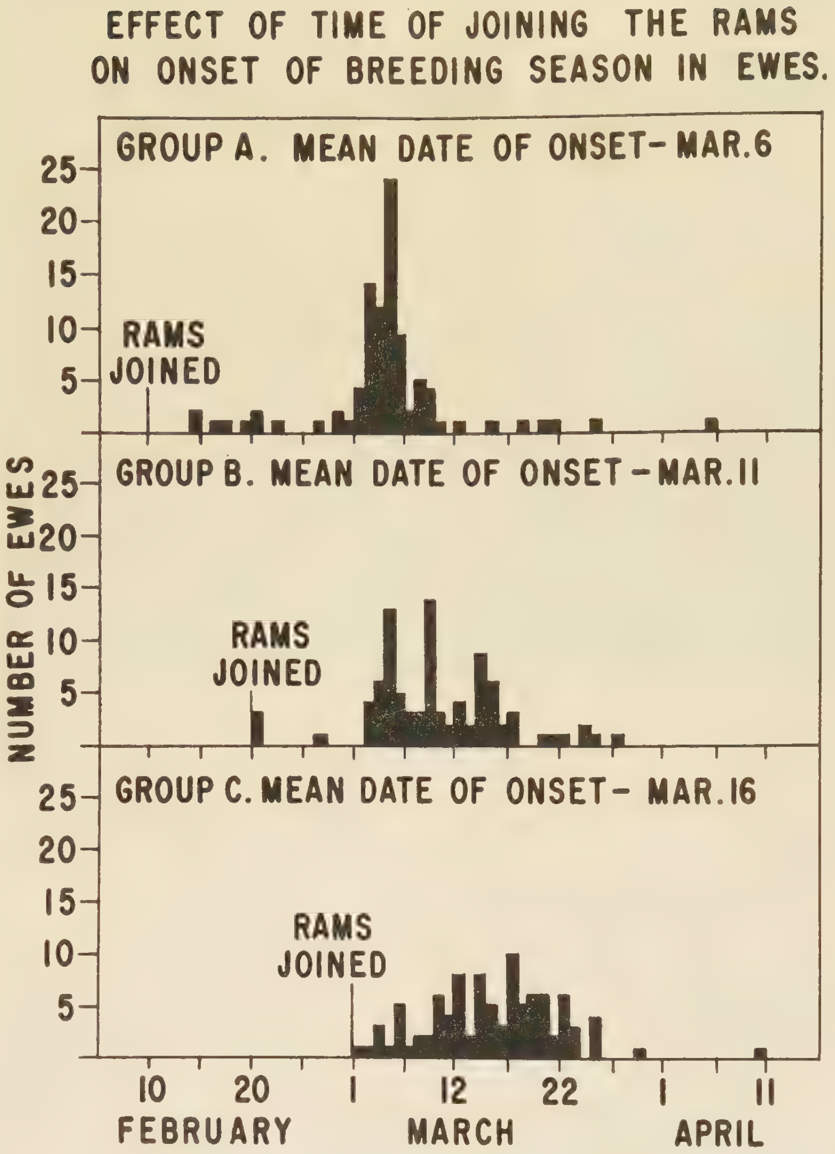
Time of Joining and Onset of Breeding Season

Australian workers have shown that turning out the rams at a particular time in the year affects the incidence of subsequent heat periods in Merino ewes.

Last year at Ruakura E. D. Fielden, by turning out teaser rams in February, showed that the breeding season of Romney ewes could be advanced.

If the rams join the ewes when the ewes are approaching their breeding season but before they experience the ovulation without heat (silent heat) which often precedes their first heat, many of the ewes are stimulated to ovulate about six days later and come into heat about 17 days after that; that is, about 23 days after joining the rams. Once the ewes have begun their own breeding cycles the presence of the ram cannot affect them in this way.

This year 300 five-year-old Romney ewes were divided into three matched flocks each of 100 ewes. Flock A joined fertile rams on 10 February; Flock B from the adjacent paddock joined Flock A and the rams on 20 February; and Flock C from one paddock further away joined Flocks A and B and the rams on 2 March, about the usual time for this area.



EFFECT OF TIME OF JOINING THE RAMS ON ONSET OF BREEDING SEASON IN EWES.

GROUP A. MEAN DATE OF ONSET- MAR.6

GROUP B. MEAN DATE OF ONSET - MAR.11

GROUP C. MEAN DATE OF ONSET- MAR.16

The text below gives conclusions which can be drawn from the graphs.

The onset of the breeding season has been clearly influenced by the treatments (see graphs above). The mean date of the onset of the breeding season in Flock A was 6 March, in Flock B 11 March, and Flock C 16 March.

The fertility of all flocks was the same, and the mean date of the first successful tupping in the three flocks was 10, 15, and 20 March respectively.

The peak of tupping about 23 days after the joining of Flock A with the rams is clearly shown. This leads not only to an earlier lambing, but also to a relatively concentrated lambing.

In Flock B the ram effect is evident sooner than the expected 23 days after the flock entered the paddock with the rams. This is perhaps because the ewes were in the paddock next to the rams from 10 February, this stimulus having a diluted effect compared with Flock A. Australian workers have shown that the sight or smell of males stimulates females without the necessity of actual contact.

Before joining ewes and rams earlier than usual to advance the breeding season, it is probably best to keep them separated by at least one paddock to gain the maximum effect of the stimulus of turning out the rams.

Freedom-from-Hunger Campaign

Spectacular Increases in Japanese Livestock Industry

40 Per Cent Decrease in Farming Population Expected by 1970

THE latest production figures of the Japanese livestock industry show a spectacular increase of domestic animals in the country. The number of cattle rose from 2,400,000 in 1952 to 3,350,000 in 1959. There are now some 2,000,000 dairy cows, which is more than ten times the number before the Second World War. The number of pigs trebled between 1952 and 1959, rising from 500,000 to 1,700,000. The number of sheep increased from 400,000 in 1952 to 1,000,000 in 1959. There are now 50,000,000 chickens against 20,000,000 in 1952.

IT is officially estimated that the total value of livestock production in Japan will in 10 years represent one-third of the total agricultural production and will at that time be equivalent in value to the production of rice.

Turning from Fish to Livestock Products

Rice, fish, and vegetables have for long constituted the main diet of the Japanese, with fish providing the largest source of animal protein. In the immediate post-war period, Japanese fishing was restricted and over-fishing in home waters became a serious problem.

At the same time, increased contacts with Western people and supplies of popular Western food influenced the food habits of large sections of the urban population. Milk distribution in schools has also been an influencing factor.

As a result of these various developments the Japanese have acquired the habit of consuming more meat, eggs, milk, and dairy products. Such consumption led to a rising standard of living and changing dietary patterns and in particular led to a demand for meat. This demand has become so strong that it is expected to rise in 10 years to five times its present level.

Milk and Meat from Pastures

The Government's policy, which had as its first aim "milk from pastures", is now being developed to include the fattening of "beef from pastures". This vast programme for the livestock industry has, of course, to be based on a pasture improvement policy, since owing to the shortage of cropland the Japanese cannot afford to feed their animals with grains, which are mostly consumed by the human population. To conserve the cropland the livestock industry will be increasingly concentrated in the uplands, where rice cultivation is not possible.

FAO Assistance

As the Japanese had little or no experience in pasture management and improvement on hills and mountains, they asked the Food and Agriculture Organisation (FAO) to assist them with the programme. Since 1955 FAO experts have advised the Government on overall use of mountain grassland.

These uplands have to be carefully managed; otherwise erosion and floods may damage the fertile croplands in the valleys and plains. Land classification studies were made, comparisons were established between the "cut and carry" and grazing systems of pasture, local types and foreign species of grass and clover were tested, livestock management training courses for technicians and extension workers were organised, and fellowships were awarded to a number of pasture management specialists.

Factors Influencing the Livestock Industry

Several factors govern the future development of the livestock industry. For example, the use of improved upland pastures for grazing dairy cows is still limited by the distances of the pastures from the villages and the difficulty of access. The Government has launched a road-building programme aimed at overcoming these difficulties.

There are, of course, encouraging prospects for the development of the livestock industry in the plains and valleys because of new possibilities of crop rotation. For instance, new types of rice which mature in about 100 days, instead of the normal 150, have been developed. These types of rice have made possible a shift in cultivation practices which releases more land for use in growing pastures and fodder crops, thus opening possibilities for the development of a livestock industry where previously only rice was grown.

Small Size of Average Farm

One obstacle to this development is the small size of the average farm—about three hectares (7½ acres)—but the general economic development of the country is bringing about a change. Industrialisation, with its higher wages and promise of rapidly rising standards of living, is already attracting labour from the rural areas. This trend is expected to become stronger and, in fact, it is estimated that by 1970 industry will have reduced the farming population by 35 to 40 per cent. This will result in economic pressure to form bigger farms where diversification of crops and mechanisation will be possible.

This rise of the livestock industry in Japan is a remarkable example of how a change in dietary habits has been a dominant factor in inducing changes in agricultural patterns and, at the same time, has benefited the farmers. Their income is higher from mixed farming than it was from the traditional paddy, wheat, and barley rotation.

Bamboo Shelter Belts on Waikato Peat

By J. C. GERLACH,
Tropical Agronomist,
and H. A. BROWNING,
Scientific Officer,
both of the Department of
Agriculture's Rukuhia Soil
Research Station

ESTABLISHMENT of quick-growing permanent shelter belts on peat farms is often difficult. The shallow-rooting gums and macrocarpa are liable to be blown down by high winds; barberry and boxthorn do not grow well on peat; and lawsoniana is unreliable. Phormium flax is satisfactory as a low shelter, but occupies a wide area, since a double or treble row is needed. Bamboos are quickly established and shallow rooting. The root mat is dense and the stems strong and resilient. Experiments have been carried out with bamboo varieties on different types of peat in the Waikato basin, where rainfall is about 48 in. and frosts of up to 15 degrees F occur.

Phyllostachys mitis forming a dense shelter belt at Lake Cameron in its third year.

TRIALS were on raw peat on the Moanatuatua swamp, on developed peat on the margin of the Rukuhia swamp at Lake Cameron, and on consolidated peat near Gordonton. The Rukuhia trial at Lake Cameron is on an area with controlled water tables of 6, 12, 18, and 24 in. depth that has been developed for the study of pastures and crops. An area covering all water tables was allocated to vegetable studies. Maize was used as a windbreak in 1957, but permanent hedges were needed on the exposed westerly and southerly headlands. Fifteen varieties of bamboo were planted in 1958, including the commonly occurring *Pseudosasa japonica* (*Arundinaria japonica*) as a standard of comparison on all water tables.

On raw peat at Moanatuatua 10 varieties were planted, and nine were tested on consolidated peat near Gordonton by the Farm Advisory Officer, Hamilton. These trials were laid down in 1959. Fertilisers were as for pastures on peat, with additional nitrogen. Little or no weeding was done. All trials had considerable competition from blackberry, bracken, and tall grasses. However, the bamboos competed with the weeds in rate of growth.

Useful Shelter after Two Years

At Lake Cameron some varieties provided useful shelter after two years. By the end of the third year they were good hedges varying from 6 to 12 ft high according to the variety. At this stage the spreading habit of some varieties was also evident, some sending runners out up to 20 ft into the adjacent pasture. Sheep grazed the young shoots as they appeared. A ditch about 2 ft deep will stop spreading of bamboo; in pastures double fencing, as with normal shelter plantations, is needed because of the palatability of bamboo to stock.

Excepting *Bambusa ventricosa*, the clump varieties, which send up all new growth close to the parent plant, were slower establishing and those grown were less hardy than the spreaders, becoming largely defoliated in winter. It was apparent that as the density of these varieties increased they became better acclimatised.

It may be advantageous to reduce the spacing for clump types from 3 ft to 2 ft in the row. This would increase the cost of plant material.

Height of Water Table

Where one variety was planted on more than one water table, marked differences became apparent. For most varieties the 12 in. water table appeared to be the limit for healthy growth. Where the water table was closer to the surface establishment was much slower, except with *Arundo donax.* This close relative of the bamboo succeeded on the 6 in. water table, though the foliage is frost tender. However, it forms an untidy hedge inferior to flax.

In the Moanatuatua trial six varieties were planted for shelter along main drains in 1958. The following year three varieties were set out as a feeding trial on raw peat in its first stage of development.

The plants suffered from drought and nitrogen deficiency in their first year, making an extra application of sulphate of ammonia necessary.

Establishment under these more severe conditions appeared to be slower, since none of the varieties had formed a close shelter after two years.

It seems likely that on raw peat heavier applications of fertiliser will be required to obtain the same effect as on developed peat.

The trial on the farm north of Gordonton planted in 1959 showed the same pattern of development as at Lake Cameron, the foliage being even brighter green, despite severe weed competition. Here also the spreaders appeared the hardiest and *B. ventricosa* was the only clump type with satisfactory growth.

In the period of observation the spreaders sent their culms (stems) up from October onward through the summer. The *Bambusa* make no shoot growth until after the new year, and continue sending up their culms into late autumn. These late culms, being soft and without foliage, are often injured by frost in winter.

Recommendations

Based on the very encouraging results from the trials described, the following bamboo varieties (all hardy) can already be recommended for shelter belts and hedges on Waikato peat land with a water table of 1 to 2 ft below the surface:

The only clump type showing promise at present is *Bambusa ventricosa* on the 12 in. water table.

Further Trials

Some of the slower establishing varieties might form a good hedge later, and among the more than 50 varieties now available in New Zealand other species might prove useful on peat. Promising varieties that have been assembled since these trials were laid down will be substituted at Lake Cameron for varieties that have proved unsuitable. The results will be published when the trials are finished.

Variety	Spreading capacity	Type of cane	Height in 3 years	Suitability for shelter
Phyllostachys mitis	Very fast	Straight, strong	15 (30*)	Good tall windbreak, slightly open (unbranched) at the base
P. aurea	Moderately fast	Straight, strong	10 (20*)	Medium-sized densely foliaged shelter in three years
Arundinaria japonica	Fast	Straight, weak	10 (15*)	Good medium - sized shelter, densely placed canes and foliage
A. hindsi	Very fast	Straight, strong	11 (15*)	Good medium - sized shelter, branches fairly short but densely foliaged
A. senanensis	Moderately fast	Straight, thin, resilient	6 (9*)	Good low shelter, densely placed canes and foliage

The best planting time for these varieties is August/September.

* Full height on mineral soil

Meteorological Records for July

Station	Height of station above M.S.L. (ft)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	51.1	+0.6	65.8	31.9	6.37	21	—0.9	2.09	16	158
Auckland	160	51.1	—0.3	64.6	37.6	7.81	18	+2.3	2.85	16	142
Tauranga	12	48.4	—0.3	62.3	31.7	5.24	15	+0.2	1.46	17	169
Ruakura	131	47.0	+0.5	63.7	26.2	7.56	19	+3.0	2.97	16	135
Whakarewarewa	1,006	45.2	+0.9	60.3	29.4	5.62	20	+0.9	1.31	28	120
Gisborne	14	48.3	+0.6	64.6	28.0	4.05	16	—0.9	1.27	19	153
New Plymouth	160	48.9	+0.0	59.9	36.4	10.73	18	+4.5	3.99	16	146
Karioi	2,125	40.2	—0.2	54.5	23.2	5.47	20	+1.3	0.76	6, 9	
Napier	5	48.3	+1.0	67.9	29.7	4.14	12	+0.6	1.13	21	144
Wanganui	72	47.2	—0.4	61.1	30.3	3.52	14	+0.6	0.66	9	116
Palmerston North	110	46.2	+0.1	61.0	27.9	4.54	16	+1.4	0.75	6	112
Waingawa	340	44.7	+0.2	61.1	23.5	5.19	19	+1.3	0.77	20	101
Wellington	415	46.8	+0.5	57.1	33.8	7.50	20	+2.4	1.92	21	112
Nelson airfield	5	42.8	—0.5	60.9	24.4	5.77	10	+2.9	2.80	16	174
Blenheim	14	45.4	+1.3	62.1	27.0	3.38	9	+1.0	0.98	7	171
Hanmer Forest	1,270	39.4	+0.9	59.6	18.0	4.32	16	+0.6	0.83	17	92
Hokitika South	15	43.4	—0.2	56.1	28.0	11.09	17	+2.8	1.83	6	118
Christchurch	22	43.4	+1.1	64.9	24.3	4.63	13	+2.2	1.27	17	106
Ashburton	323	41.7	+0.6	64.6	20.6	3.52	9	+1.3	1.14	18	89
Timaru	56	42.1	+0.7	61.8	27.7	3.36	9	+1.9	1.35	18	85
Alexandra	520	37.9	+1.6	60.5	21.5	0.36	7	—0.3	0.10	6	90
Taieri	80	40.8	—0.2	62.8	22.5	3.47	14	+1.6	1.31	18	85
Invercargill airfield	0	40.3	—0.2	59.0	25.2	2.96	19	+0.2	0.56	10	62
Chatham Island	150	46.6	+1.0	56.1	33.9	2.11	21	—1.5	0.61	13	94

Department's First Farm Business Course

THE first farm business course arranged by the economic section of the Department of Agriculture, and held at Christchurch on 13 and 14 June, was an undoubted success. Over 200 attended and the course could well be the forerunner of others in this field, where it could do much to bring closer together workers in commerce and in agriculture.

Among those who attended were representatives of stock and station agents, trading banks, lending institutions, public accountants, farm servicing firms, and Government departments.

The Department of Agriculture's part in arranging the course was a clear indication of its recognition of the need for greater integration of business people serving agriculture into the economic advisory activities of the Department.

The course was in two phases. The first day consisted of papers dealing with the varied farming systems from Blenheim in the north to Waimate in the south as well as some technical papers on related subjects.

Several papers dealt with the changes in managerial techniques resulting from changes in marketing conditions, others with soil conservation, land development, drainage, and irrigation.

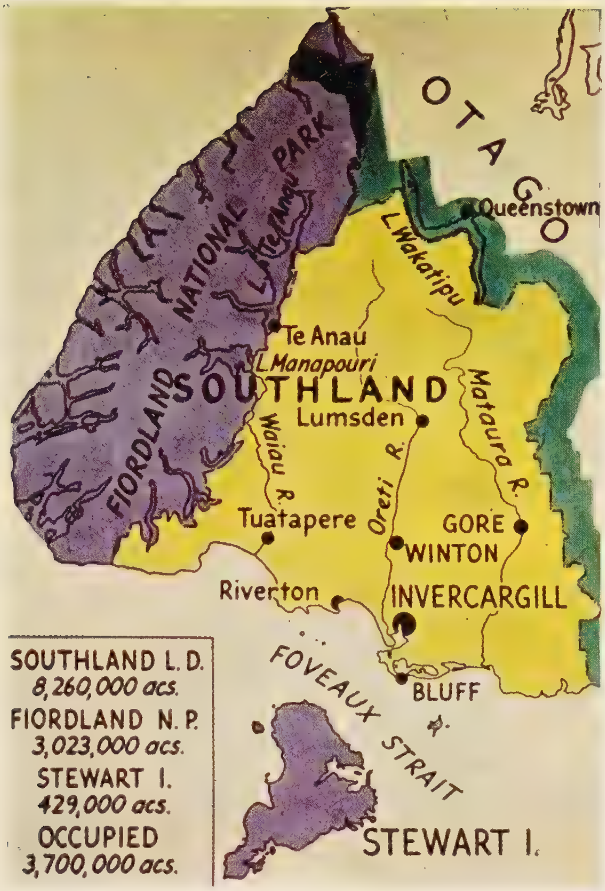
These papers were intended as a background to the second day's papers, which dealt specifically with farm borrowing, standardised farm accountancy, and estate planning.

The papers on the second day showed the growing awareness of the importance of treating the farm unit as a business, interest in financial aspects of land improvement and management having been stimulated by farm management surveys made by Department of Agriculture field economists since the end of the Second World War.

Standardisation of farm accounts so that they are compiled to a constant pattern and also provide farmers and finance institutions with a clear picture of costs and returns was discussed.

At the suggestion of the Department of Agriculture this proposal has been exhaustively investigated by the New Zealand Society of Accountants, whose research committee has set down a standard code which it is hoped will be adopted generally in the compilation of farm accounts.

Land Development Possibilities in Southland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By G. J. WATT,*

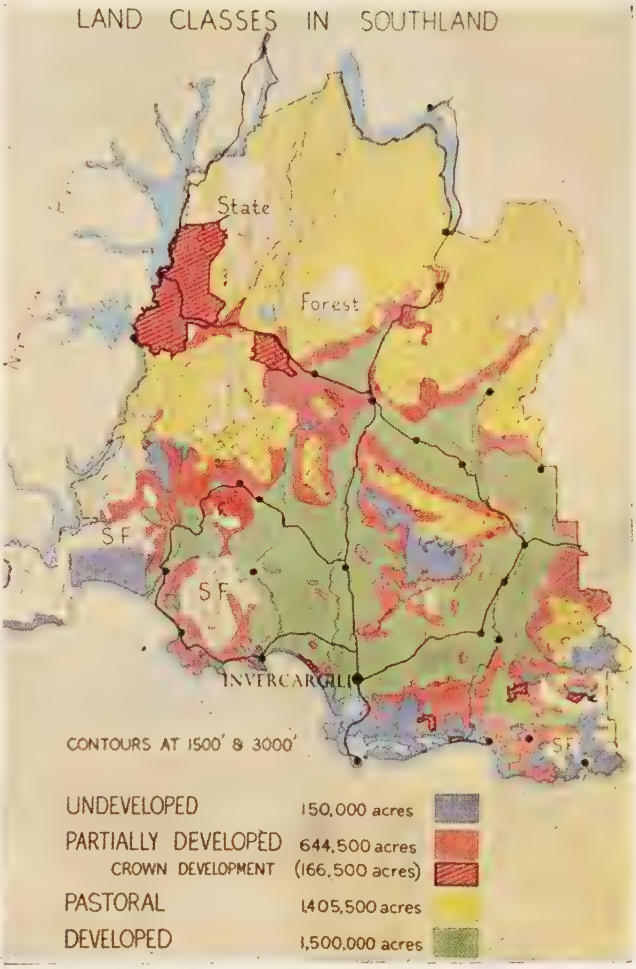
Commissioner of Crown Lands, Invercargill

SOUTHLAND today has every outward evidence of growth, and the expansion of harbour facilities at Bluff and the establishment of new freezing and fertiliser works indicate the extent of the province's development.

The casual visitor to Southland sees highly fertile farms, attractive homesteads, and an air of solidarity and prosperity.

A closer study reveals that there is still considerable potential in farming development in Southland, a potential which could be realised during the next 20 years by a combination of State and private enterprise.

THE Southland Land District comprises 8,260,171 acres, of which about 3,700,000 acres is occupied. This is the area from which development must come, as the unoccupied land capable of economic development by 1980 is very limited. The occupied land falls into four classes:


LAND CLASSES IN SOUTHLAND
State
Forest
S F
S F
INVERCARGILL
S F
CONTOURS AT 1500' & 3000'
UNDEVELOPED 150,000 acres
PARTIALLY DEVELOPED 644,500 acres
CROWN DEVELOPMENT (166,500 acres)
PASTORAL 1405,500 acres
DEVELOPED 1,500,000 acres

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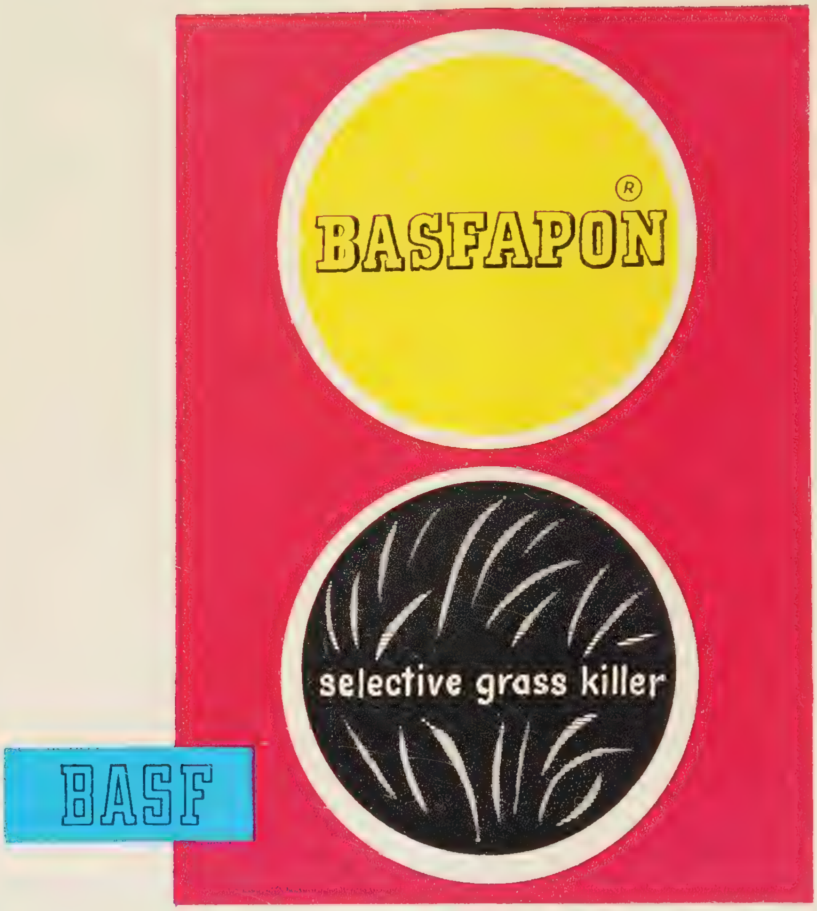
* Since he gave the paper of which this article is an adaptation to the conference of the N.Z. Grassland Association in Invercargill in November last, Mr Watt has been transferred to Christchurch as Commissioner of Crown Lands there.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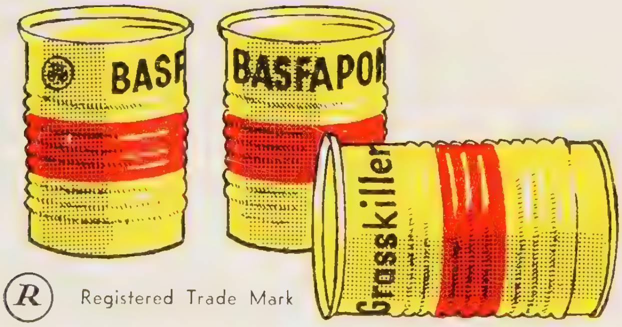
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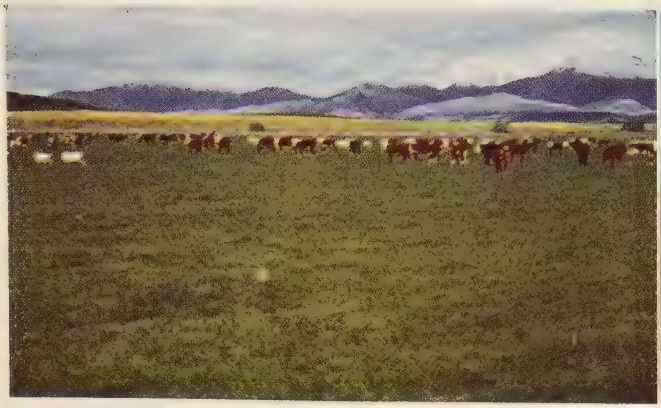

Original pasture on Lynwood Farm Settlement. Undeveloped land covered in fescue tussock is in the immediate background on Whitestone Farm Settlement. The Takitimu mountains are in the background.

One-year-old pasture on Lynwood Farm Settlement with cultivated areas in the background.

	Acres
Undeveloped	150,000
Partially developed ..	644,500
Pastoral	1,405,500
Developed	1,500,000
	3,700,000

Undeveloped Land

The undeveloped land lies mostly in the Upper Waiau, Hokonui, and Seaward Moss districts. Nearly half of the 150,000 acres is in partly milled bush, the rest being tussock and swamp. Development on the whole will be slow and costly, but it is likely that the Crown will play a considerable part, and by 1980 46,000 acres should be grassed. Stock increases should be substantial. Estimates are:

	Sheep	Run cattle	Dairy cattle
1960 ..	4,500	200	—
1970 ..	22,000	1,100	200
1980 ..	92,300	3,400	400

Partially Developed Land

The 644,500 acres classed as partially developed includes the land at present under development by the Department of Lands and Survey, most of it in the Te Anau district. The rest of this land is mainly in the Waiau, Wairaki, Birchwood, Nightcaps, Gorge Road, Seaward Moss, and Otaraia-Waiarikiki districts. The acreage in grass by 1980 is assessed at 340,000, an increase of 90,000 acres on the 1960 figures. The stock potential is in sheep and run cattle:

	Sheep	Run cattle	Dairy cattle
1960 ..	377,900	30,600	18,500
1970 ..	1,038,000	38,900	18,500
1980 ..	1,612,800	49,200	18,500

Pastoral Land

Most of Southland's 1,405,500 acres of pastoral land is in the north and is mainly held under Crown lease. A little over half is above 3,000 ft, 31 per cent is between 1,500 and 3,000 ft, and 16 per cent below 1,500 ft.

Soil conservation is vital on much of this land and there is a growing awareness among runholders, scientists, conservators, and landlords that conservation is synonymous with good management. The arable land, 90,000 acres, is quite significant and the 15,500 acres now in grass should be increased to 46,000 acres by 1980.

Aerial operations should play an important part in future development, though little of the 1,000 tons of superphosphate being applied annually to the pastoral land has gone on above 1,500 ft. Annual sheep increases on pastoral land are estimated to average 2.2 per cent over the 20-year period and cattle 3.3 per cent. The figures are:

	Sheep	Run cattle
1960	312,400	11,300
1970	353,900	14,500
1980	398,000	19,800

Undeveloped land on Whitestone Farm Settlement, showing the predominant natural cover of fescue tussock. This is typical of a large portion of the land being developed in the Te Anau area by the Department of Lands and Survey.

Four-year-old pasture near Te Anau township, with Lake Te Anau in the background. The stony terraces are typical.

Something to crow about!

Recent Official Field Tests proved that 4% **good-quality** Dehydrated Lucerne Meal adequately meets the vitamin A requirements for laying pullets, and in addition, gives greatly superior yolk colour. These Tests further proved that the Lucerne Meal **must** be of good quality before it can be adequately relied upon as a source of vitamin A. That's why you should **insist** on Springfeed.

-SPRINGFEED supplies Vitamin A AND GOOD YOLK COLOUR!

(FOR FREE!)

Moreover the Tests proved that poultry fed only on vitamin A, produced eggs with pale insipid yolks . . . and remember, the New Zealand housewife demands eggs with **good** yolk colour. Springfeed Lucerne Meal gives good yolk colour **and in addition** supplies vitamin A, B2, E and K, full requirements for laying pullets. **Insist** on Springfeed.

IT'S THE COLOUR THAT SELLS!

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Springfeed

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In 50lb Waxed Multiwall Bags.
At Grain, Seed and Produce Merchants everywhere.

Made by
MARLBOROUGH LUCERNE MEAL CO. LTD.
BLENHEIM

Developed Land

That there is a substantial unrealised potential in the 1,500,000 acres of developed land is shown by the fact that while 5 to 6 ewes to the acre with 120 per cent of lambs is not uncommon, the overall average carrying capacity is about 3.5 ewe equivalents to the grassed acre. The estimated annual average increase in sheep is 1.2 per cent, the potential stock figures being:

	Sheep	Run cattle	Dairy cattle
1960 . .	5,059,200	66,900	27,000
1970 . .	5,762,300	86,000	27,000
1980 . .	6,349,500	99,000	27,000

Potential Stock Numbers

Overall, sheep numbers should increase from 5,754,000 to 8,452,000, an annual average of 2.54 per cent over the 20-year period. Total run cattle should increase from 109,000 to 170,000 at 2.85 per cent each year, though run cows are expected to increase at a higher rate, 3.43 per cent.

Increased emphasis on beef cattle would take advantage of improved killing and handling facilities and with the emphasis now on baby beef, the aim should be to dispose of fat stock before a second winter.

The dairy cattle potential is the most difficult to assess, due mainly to the human factor. Overall, little increase is likely, though dairying offers opportunities for younger men with limited finance to bring in virgin land, and Southland has consistently led the South Island in butterfat production per cow. Last season, for example, the Southland average was 356 lb against a South Island average of 334 lb.

Realisation of the potential stock numbers should see sales of wool increase from 185,000 to 276,000 bales, nearly 50 per cent, over the 20 years, and sheep killings should rise from 4,000,000 to 6,170,000. Prime beef cattle, 23,000 in 1960, should increase to 38,000 in 1980, while dairy produce other than town supply should remain static. As a result, the total income from this primary produce, at £21 million in 1960, should increase to £26.5 million by 1970 and to £31.3 million by 1980. In addition, cash crops and small seed production will continue to make worth-while additions to Southland's farming income.

Land Development

The sustained and substantial increase in production outlined is capable of achievement only through the combined efforts of State and private enterprise with the greater contribution from private enterprise. Government land development should be concentrated where most capital is needed and where returns are slower.

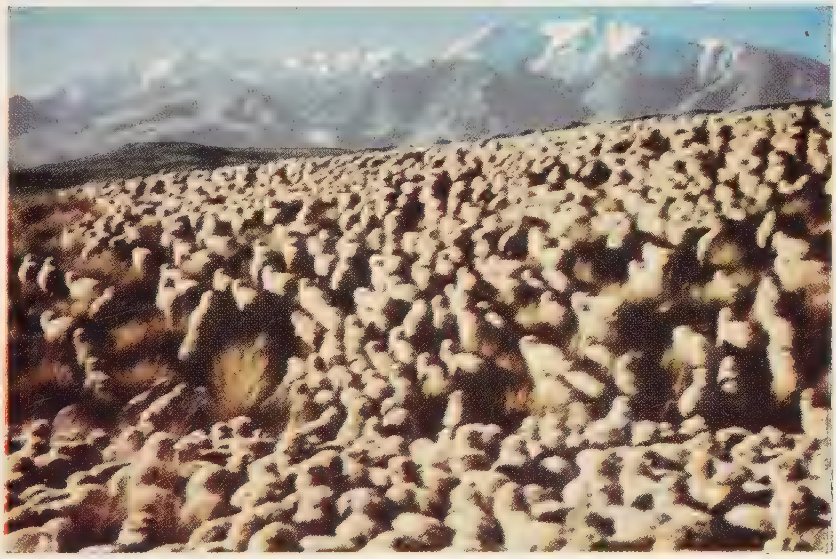
LAND DEVELOPMENT IN SOUTHLAND

In the foreground is recently developed land, part of Wairaki Valley, Southland.

In the field of land development in Southland, the Department of Lands and Survey is playing an increasingly important role. With 166 500 acres in development blocks, Southland now ranks second to Rotorua-Taupo, a district which had large reserves of unoccupied Crown land. Over 100,000 acres are arable and estimated to subdivide into 186 units, but as the Crown has taken possession of 72,800 acres of this only during the past year, early settlement cannot be expected.

The main centre of operations is around Te Anau, some 100 miles northwest of Invercargill. Here there are 148,000 acres of rangeland with a natural cover, mainly of fescue tussock but with considerable areas of bracken fern, and manuka varying in height

(Continued on page 225)



Sheep winding through fescue tussock. The Takitimu mountains are in the background.

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...use

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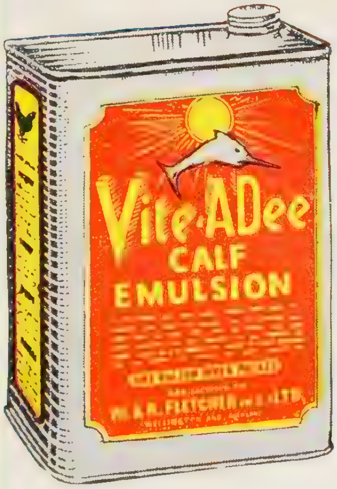
CALF EMULSION



Feeding Vite-ADee avoids scours, because the vitamins of Calf Emulsion replace the butterfat vitamins which the calf loses as soon as it is put on to skim. As you know, it is the sudden withdrawal of Vitamins A and D which so often brings on scours. Vite-ADee Calf Emulsion spreads with a quick stir, right through the skim or whey . . . and only one teaspoon per day is needed to give each calf a sound start towards healthy future production.

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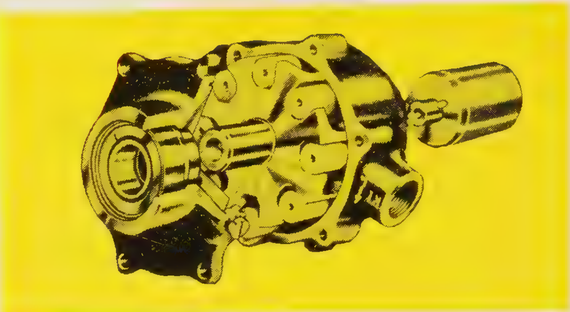
presents an ever increasing range

THE HYPRO BIG AND SMALL TWIN PUMPS ARE DESIGNED WITH ALL SPRAYING JOBS IN MIND.

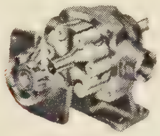
PISTON PUMPS
BIG TWIN
SMALL TWIN

BIG TWIN:
This pump can be operated at pressures of up to 400 lbs. p.s.i. and is adaptable for a wide range of uses, including crop spraying with abrasive chemicals. The performance greatly surpasses that of heavier and more costly ones.

SMALL TWIN:
Ideal for spraying of crops using all chemicals. Operates to pressures of up to 400 lbs. p.s.i. Low horse power requirements. High revving model, low in price.



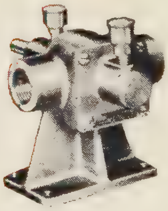
N7500.
High pressure nylon roller pump operates at 350 lbs. P.S.I. either from power take off or independent petrol engine. Little maintenance required.



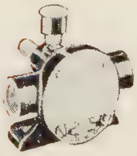
N6000.
Nylon roller pump operates at pressures up to 200 lbs. P.S.I. High and low pressures for gorse or pasture spraying. Operates from power take off or independent petrol engine.

N1500.
This extremely versatile pump can handle liquids and semi-liquids and is available for countless uses in industry and agriculture.

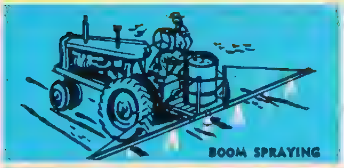
C700.
Revolutionary irrigation pump used from the power take off. 2in. pump (roller type), self priming, pumps water in high volume at pressures up to 40 lbs. P.S.I.

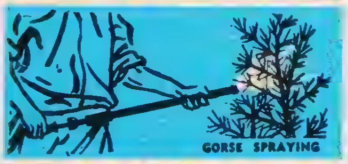


B610.
A really capable general purpose pump in high grade cast bronze. Working pressures of up to 75 lbs.



B12.
General purpose pump. Pumps liquids up to pressures of 30 lbs. P.S.I. Just right for home or industrial use.





SHEEP SPRAYING

FOR WEED SPRAYING:
Designed for both high and low pressure use, the models N7500 and N6000 are most suitable for pasture spraying as well as higher pressure spraying of gorse and blackberry, etc.

FOR SHEEP SPRAYING:
Hypro Pumps are most suitable and economical for the new sheep sprayers. They provide ample pressure and volume for either Tractor or independent engine drive. For livestock spraying they have the pressure to drive the spray material through the hair or wool and thoroughly cover the hide.

All the above pumps are incorporated in **SENTRY SPRAY EQUIPMENT** as complete Models.

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FRANK M. WINSTONE (Merchants) LTD.

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P. O. BOX 2195, AUCKLAND

(Continued from page 221)

and density. The arable land, 90,000 acres, rises from the shore lines of Lakes Te Anau and Manapouri at 600 to 1,500 ft. The overall carrying capacity of the area as pastoral land is estimated at 1 sheep to about 6 acres, but the tussock areas could be credited with 1 sheep to 3 to 4 acres, indicating the low fertility rating of these bouldery glacial moraine and loess soils.

Lynwood Farm Settlement was the first tussock area to be acquired in 1953. Of the 63,000 acres originally taken, 39,649 acres (including 4,000 acres in bush) are being tackled for development. The block was divided recently into three sub-blocks to give maximum efficiency in handling of stock and pastures. At the end of the present grassing season 22,000 acres of grass will have been sown and next year the final target of 23,500 acres will be reached.

Pasture Establishment

Pastures have been established with varying success, but progress has been slower than was originally hoped. As a result of trials laid down by the Department of Agriculture manurial treatment has been doubled and lime increased, the lime being applied before discing and follow-up cultivation; two tons per acre is sown at this stage, followed by another ton.

The aim is to sow all grass not later than November and a typical seed mixture is 15 lb of ryegrass, 5 lb of cocksfoot, 2 lb of timothy, 3 lb of white clover, 2 lb of Montgomery red clover, and 2 lb of dogstail, a total of 29 lb.

This season clover will be inoculated and pastures sown down with 4 cwt of superphosphate per acre (2½ oz of molybdenum) followed by 2 cwt of DDT superphosphate in autumn and a further 2 cwt of superphosphate in spring. An average soil test of 0.5 of phosphate against an optimum rating of 9 suggests a marked deficiency and possibly the position is aggravated by fixation in the soil coupled with a retarded nitrogen cycle.

Lynwood, when taken over, was carrying 4,350 sheep and 1,100 cattle. The present area is now running 24,000 sheep and 3,800 cattle, but it is estimated that with 22,000 acres grassed, stock numbers will be increased to 32,800 sheep and 4,000 cattle next season.

This represents 1.27 ewe equivalents per acre grassed plus cattle. At least 2 ewe equivalents per acre should be reached by settlement; otherwise the undertaking would be costly to the taxpayer and wasteful of land in that fewer sections would be available.

Settlement is envisaged on the basis of 1,000 ewes and replacements, but with a good potential which can be fully realised only on the second round of grassing. Last year 4,000 wether lambs were fattened, averaging 34 lb with 36 per cent of seconds.

The potential of the Seaward Moss area, only 17 miles south-east of Invercargill, must be considered. The soil is mainly a peat complex of varying depths and in 1951 the Department of Lands and Survey undertook pioneering work in this area. Several years later the Catchment Board provided outfall drainage and now 1,400 acres of pasture have been established. The potential here is good, but its development will be costly, and to date Crown as well as private development has been confined to the more favourable areas.

Marginal Lands

The administration of the Marginal Lands Act 1950 is an outstanding example of Crown and private cooperation and is a most rewarding facet of the work of the Department of Lands and Survey. Since the scheme was introduced 76 loans averaging £3,850 have been granted to private farmers in Southland.

A successful strike of white clover on an area of native grasses which has been aerial topdressed and oversown.

Kill problem grasses with DOWPON

FULLY TESTED AND PROVED BY NEW ZEALAND FARMERS

For the farmer who has a grass problem, Dowpon* grass killer provides a safe, sure and inexpensive solution. Dowpon *systemic* herbicide does not have to soak through the soil to reach the roots. When Dowpon is sprayed on the leaves, the active ingredient, Dalapon*, penetrates the plant's growing system deep down into the roots, killing the whole plant. Dowpon is ideal for killing grass weeds with travelling roots such as Couch, Paspalum and Kikuyu, because it is *more* effective, yet *less* expensive than repeated cutting or hoeing.

PASTURE RENEWAL

Spray Dowpon on old, worn-out pastures . . . also hilly areas difficult to reach with machines. Dowpon controls moisture — and nourishment-robbing nuisance grasses . . . permits re-seeding of high-producing legumes and grasses.

SELECTIVE WEED CONTROL

Spray Dowpon on grass weeds in orchards, applying when grass has good foliage and is growing vigorously, but before seed stalks appear. A second spot treatment later easily catches sprouts missed the first time.

NON-CROP GRASS CONTROL

Use Dowpon to control grasses in headlands, along fence lines . . . and to prevent grass from spreading onto your croplands. And because Dowpon acts systemically, and need only be sprayed on the foliage, you can kill raupo and grasses clogging irrigation and drainage ditches even when they are standing in water.

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**Dowpon is a trademark of the Dow Chemical Company for its grass killer containing Dalapon. Dalapon is the Company's brand trademark for 2,2-dichloropropionic acid.*

YOU CAN DEPEND ON

DOW

Hereford cattle grazing on one-year pasture on Centre Hill Station. Scrub-covered terraces on the left are part of Mt. Hamilton Farm Settlement, with the Takitimu mountains in the background.

Of these, 23 farms are within 10 miles of Invercargill, and another 27 between 10 and 20 miles, the majority in the Seaward Moss area. Of the money advanced 18 per cent has been for draining, 44 per cent for clearing and grassing, and the balance (38 per cent) for buildings, fencing, stock, and plant, etc.

Marginal Lands finance has opened the gateway to increased production, but the secret of success lies in the industry and integrity of the farmer, aided by his wife. Stock firms and lending institutions have made a marked contribution.

In the realisation of the yet untapped potential of Southland, Marginal Lands assistance must find an ever-increasing place. However, because this form of rural credit is designed to finance development only where finance is unobtainable from normal sources the greater proportion of privately occupied land is beyond its scope.

Incentive to Young Farmers

If the potential of the private land in Southland is to be realised, there is a need for the older generation of farmers frankly and freely to study their individual circumstances. There is a not unnatural tendency for parents to retain control too long, while their family yearn for greater responsibility and ownership. The tendency for some estates to be be run with indifferent results can also deny the younger generation the incentive to increase production.

There is a fruitful potential in the Young Farmers' Clubs in Southland, a movement with a membership of 1,000. A recent survey indicates that over 60 per cent will have insufficient finance to acquire farms, and of these 40 per cent desire settlement within the next five years. There is a zeal for progress here and a need for enthusiasm to be guided into the most useful channels.

Mt. Linton Station

That private enterprise can make a major contribution has been demonstrated again and again. Perhaps the best known example is the performance on the Mt. Linton Station. In 1945 the late Mr Noel McGregor started a major scheme, which has been continued by his trustees, in which some 8,000 acres have been brought in partly from poor-quality red tussock land but largely from scrub and fescue tussock. Several thousand acres have been oversown and topdressed. Stock in 1945 numbered only 11,000 sheep and 350 cattle, in striking contrast with the present figures of 32,000 sheep and 2,500 cattle. The wool clip has increased five-fold. It is little wonder that Southland, the sixth largest land district in New Zealand, has the fifth highest number of sheep, the fourth highest number of ewes, and the third highest number of lambs.

The Challenge

If the goal of full production is to be achieved and maintained, in Southland or elsewhere, combined effort of farmer, financier, and scientist is essential.

New Zealand's greatest contribution to a hungry world must be largely the exportable surplus of her primary produce. Southland's farming past and the present tempo of development give cause for healthy optimism that the challenge will be met.

Guides to Farm Management
within Terms of Restrictions on Use
of Insecticides on Pastures

RESTRICTIONS on the use of insecticides, and particularly of DDT, on pastures that are prescribed in the recently gazetted Agricultural Chemicals (Insecticides) Regulations 1961 will undoubtedly call for alterations in the management of many farms. The terms of the regulations are, however, in line with practice on farms where reasonable precautions have in any case been taken, and successful control of pasture pests on these farms, without the risk of residues in their animal products, makes it clear that observance of the regulations need not entail any lowering of standards of management or loss of production.

THE regulations' main restrictions on the use of DDT are:

All pastures to be treated should be dry.

Cattle pastures must not be more than an average height of 3 in., and sheep pastures 1 in., at treatment.

Only a third of the total acreage of a property may be treated at one time.

Eight weeks must elapse before another third may be treated.

Treated pastures must not be grazed with sheep or beef cattle less than four weeks after treatment or with dairy cattle less than six weeks after treatment.

As a guide to farmers, recommendations on broad lines for the use of DDT for pasture pest control for the main classes of farming have been drawn up by the Department.

Dairy Farms

Apply:

With autumn topdressing to areas that have been cleaned off before being closed for autumn-saved pasture.

In the winter when stock are concentrated on restricted areas of pasture with hay or silage supplement.

At time of sowing pastures or renovating them by any of the modern overdrilling techniques that require pasture to be first close grazed.

To paddocks to be shut up for hay, silage, or pasture seeds, provided they are treated before the grass is above the stipulated minimum height (2 in. to 3 in. for dairy pastures).

Thus, if a third of a dairy farm is annually saved for hay and silage and another third for autumn-saved pasture, apart from the proportion sown to new pasture or overdrilled with a pasture mixture or greenfeed cereals, there can be considerable elasticity in any DDT treatment plan. A third could be treated in the spring, a third in late summer or early autumn, and the remainder, if necessary and if the state of the ground allows, in the winter when stock are more confined.

Fat Lamb Farms

Apply:

With late summer or autumn topdressing, particularly to areas shut up for autumn-saved pasture after mob stocking. By this time most of the lambs have been sold and ewes can be concentrated.

In the winter when growth is dormant and stock are confined to smaller areas.

At the time of sowing new pastures or renovating older ones.

To areas intended for pasture seed production, hay, and silage before they are closed, provided the pastures are first close grazed.

APPLICATION OF DDT

REGULAR use of DDT for the control of grass grub and porina in pastures has had a marked effect in allowing stocking rates to be increased throughout the country.

Recent research work confirms earlier recommendations for the correct use of DDT. Summarised, these are:

Severe damage to crops and pastures can be prevented by regular application of DDT by ground machine, aeroplane, or helicopter.

To ensure even distribution, the mixture should be applied through a box type topdresser and not through a blower or spinner. If it is to be applied from the air, wet mix should be used.

Either wet mix or dry mix DDT superphosphate or DDT serpentine superphosphate is satisfactory, but the lower cost and the greater uniformity of the wet mix make it particularly suitable.

To stop an attack quickly when severe damage is threatened, dry mix should be used.

DDT should first be applied at 2 lb of 100 per cent para isomer per acre and at 1 lb per acre after three years if the quality of the pasture then warrants treatment.

DDT may be applied at any time of the year, but for porina control application in February and March is best.

All trash such as straw must be removed from the surface and the pasture must be grazed hard and be dry before application. Avoid early morning or evening application when dew is on pasture in fine weather.

For new pastures the material should be broadcast when the pasture is sown down or, at the latest, at the first topdressing after sowing.

Stock should be kept off for the periods stipulated in the regulations (four weeks for beef cattle and sheep and six weeks for dairy stock; if there has not been 1 in. of continuous rain or if it has been necessary to apply the DDT to wet pasture, in-milk cows must be kept off for at least eight weeks). It is in any case wise to wait until a good heavy rain washes the DDT into the ground.

Mixed Crop, Seed, and Fat Lamb Farms

Recommendations for this system hinge largely on the area devoted to cropping; the greater this area is the easier it is to formulate a scheme to avoid any managerial problems. For example, if a three-year rotation is adopted, a third of the farm would be ploughed from lea annually and a third sown to pasture and treated with DDT at sowing. Otherwise the times suggested for fat lamb farms would apply.

Hill Country Farms

Apply, where it is the practice, to:

Closely grazed areas before they are closed for autumn-saved pasture.

Areas being spelled from late October for fresh grazing for weaned lambs; treatment would have to be timed to allow at least four weeks between treatment and first grazing.

Hard grazed areas in the early summer or later that are being saved for hoggets in autumn.

The pattern for fat lamb farms should be followed where possible. With aerial topdressing it might be more convenient to treat a greater area than a third of the property at a time; and with set stocking it might be difficult to manage the spelling of treated pastures (four weeks for beef cattle and sheep) that the regulations require. But livestock products from hill country farms must be free of residues and the regulations must be observed.

Tussock Grassland Farms

As only improved areas on lower country around the 2,000 ft level are likely to be treated, and these form only a small proportion of most runs, it should be possible to concentrate stock after weaning on the unimproved areas while improved areas to which DDT has been applied are spelled for the specified time, especially as stock numbers would be lower than usual at this time. To comply with the regulations edible herbage on areas to be treated has to be grazed down to not more than 1 in. high for sheep.

General Comment for All Farmers

Not many farmers would treat their whole property with DDT in any one year, and this would be feasible only if enough supplementary feed were grown in addition to reserves of hay and silage.

Observance of the precautions prescribed in the regulations is essential. Meat and dairy produce are being regularly tested to see that they are being adhered to.

The more logical approach would be to plan treatment of a third of the property annually, thus spreading the cost of grub control evenly over the three years for which protection can normally be expected. If applications are made in rotation, there should be little inconvenience in complying with the regulations.

If an outbreak of porina occurs, the sequence may have to be broken and two-thirds of the property may require treatment instead of the normal third.

It should be possible to get this two-thirds done between the early autumn and winter and still allow the stipulated period of eight weeks between the application to each third, but if there has been no regular treatment plan, deterioration can be rapid. As both porina and grass grub cause less damage from July onwards, late winter application of DDT might well be uneconomic. Farmers who have not applied DDT by July could wait until the spring to assess the recovery and decide whether pasture renewal or DDT application in January is called for.

Though an appropriate time for application of the insecticide would be immediately before paddocks are closed for hay, silage, or pasture seeds, particularly as they would often comprise about a third of the property, such pastures are frequently 6 in. or more high when the decision is made to use them for hay, silage, or seed, and it is therefore illegal to apply DDT to them.

If seasonal conditions caused a deterioration in the feed position, the closed paddocks could not be fed off to relieve it until the time stipulated by the regulations had expired.

Proofing of pastures prone to grass grub and porina attack may be spread over the year without being wasteful of phosphate. Lime could be used as a medium for distribution in the late autumn and winter if normally abundant spring growth might be stimulated too much if superphosphate were used. The superphosphate could then be applied at the best time to get the result required from it. A permit from the local farm advisory officer is required for the use of a DDT/lime mixture.

THE REGULATIONS

PRINCIPAL limitations prescribed in the regulations are:

1. **It is an OFFENCE to apply any insecticide except DDT/fertiliser mixtures and pelleted preparations of finely ground DDT to pastures without a permit from the Director-General of Agriculture.**

   Farmers wishing to use insecticides other than DDT/fertiliser mixtures must apply to their local advisory officer of the Department of Agriculture. He will advise on treatment and stipulate the conditions under which the insecticide may be used and the grazing management to be followed.

2. **It is an OFFENCE (unless the Director-General of Agriculture approves) for a person to apply or cause to be applied any fertiliser containing DDT to**

   (a) **More than one-third of the total acreage of any property, in any period of 12 months, unless and until not less than eight weeks has expired since the last application of the fertiliser.**

   (b) **Any pasture on which cattle are to be grazed where the average height of the pasture is more than 3 in.**

   (c) **Any pasture on which any sheep are to be grazed where the average height of the pasture is more than 1 in.**

   (d) **Any pasture at a rate of application exceeding that specified in the directions for use on the advice note or label.**

   (e) **Any pasture unless all stock have been removed from it.**

It is an OFFENCE to graze treated pastures before the expiration of FOUR WEEKS from the date of application with sheep and beef cattle and SIX WEEKS with dairy cattle.

A brochure in which the regulations are reprinted in full has been distributed by the Agricultural Chemicals Board widely among organisations servicing primary industries. Farmers who are in any doubt about their obligations under the regulations may clarify any points with local advisory officers of the Department; or they may write to Publications Section, Department of Agriculture, Box 2298, Wellington, for a copy of the brochure.

Care of Livestock during October

By Wallaceville and Ruakura Animal Research Stations

SUPPLEMENTARY FEED

TWO important findings of Ruakura research emphasise the need for adequate reserves of hay and silage. These are that a high rate of stocking is one of the most effective means of increasing production and that the most critical period in the feeding of dairy cows is six weeks before and six weeks after calving. The higher the stocking rate the more critical become the normal periods of feed shortage and the more vital is the need for feed reserves. As stocking rate goes up less surplus feed is available for conservation, yet on farms carrying the equivalent of a cow to the acre there is still ample scope for saving sufficient feed reserves for good wintering.

During the flush period of growth average dairying pastures produce about 60 to 70 lb of dry matter per acre each day. This is more than enough to feed two milking Jersey cows. Over this period the stock can be carried on half the area of the farm, leaving the other half to be conserved. Ruakura experience shows that in an average season the saving of half an acre, in the form of silage and hay, per cow carried is sufficient to meet adequately the supplementary feed requirements of the herd and replacement stock.

SILAGE

Silage is used for two main purposes: for feeding to cows which are either producing at a comparatively low level or are dry or for use after calving as a supplement to winter grass, which is high in protein and highly digestible. In neither case is a very high quality silage required. This is fortunate, because recent research at Ruakura has shown that it is very difficult under New Zealand conditions to make good quality silage from lush, immature pastures.

Maximum yields of digestible nutrients should be the aim. Ideally this means cutting grass a week or two before the flower heads begin to emerge. If the grass is left much beyond this stage, the increased yields obtained are offset by the decline in digestibility of the harvested product, and of course only the digestible portion of any feedstuff can be used by the animal.

Ryegrass-dominant pastures cut at the stage suggested tend to be high in sugar and low in moisture content, and these, if heavily consolidated in the silo, favour the type of fermentation which minimises the losses involved in silage making.

EARLY WEANING OF CALVES

Early weaning of calves can be recommended only where high quality pastures can be made available under a system of rotational grazing. Jersey calves should reach 120 lb liveweight (equivalent to 33½ in. chest girth) before being weaned. A comparable standard for Friesian calves would be 170 lb liveweight (equivalent to 37 in. chest girth).

BLOWFLY STRIKE IN EWES

In districts where crutch strike causes trouble in ewes crutching or early shearing is advised. Close supervision is necessary to detect cases so that suitable treatment can be applied before the strike becomes too extensive. When treating cases of fly strike shear the soiled wool away from the immediate vicinity of the strike. Dressings containing diazinon, nankor, delnav, or asuntol will rapidly kill the maggots, which will be expelled from the wound. In addition treatment will prevent restrike until dipping, if this is done in January. These dressings do not prevent the flies blowing the sheep with eggs, but they do prevent the maggots from hatching and causing a strike.

Irritant fluids such as kerosene should not be used; they may kill the maggots, but they will irritate the wound and tend to cause restrike.

Jetting ewes is not usually necessary, but if fly strike is severe, it may be advisable to treat them to give protection until dipping. Apply ½ gallon of wash to the crutch of each animal, extending the wetted area to above and round the tail. A pump working at 40 to 60 lb pressure per square inch, with a hand cut-out on the nozzle, is advisable for this purpose.

CATTLE TICK CONTROL

Where cattle ticks are plentiful, spraying or dipping should be done in November and December to prevent tick worry and kill the adult female ticks before they lay their eggs.

BLACK DISEASE VACCINATION

In east coast areas of the North Island where black disease of sheep occurs vaccination should be carried out during November or early December. This will protect against the disease, which occurs mainly in summer and autumn. Vaccine should be ordered immediately.

BLOOD POISONING AFTER SHEARING

Deaths after shearing may be due to infection of cuts or bruises with the blackleg germ. This disease can be prevented by vaccinating at least three weeks before shearing. Sheep which have been vaccinated previously may not require revaccination, and a veterinarian or Livestock Instructor should be consulted about the best procedure.

MATING OF DAIRY COWS

Before each cow is mated two heat periods or an interval of at least 30 days should be allowed after calving. Cows mated before this period are less likely to get in calf, and the chances of contaminating the bull are increased. Hand-mating should be practised and accurate records kept showing the bull used and dates of all services. If breeding trouble occurs, these records will be of considerable assistance in arriving at a correct diagnosis.

COCCIDIOSIS IN CALVES

Scouring in calves under six months of age is seldom due to worms; it is much more likely to be due to coccidiosis, especially if blood is present in the droppings. Effective drugs are available for treatment, but these can be obtained only on the prescription of a veterinary surgeon, who should be consulted.

ARSENIC POISONING

Most deaths in cattle, sheep, and dogs from arsenic poisoning are caused by their drinking from foot rot baths containing arsenic. If arsenic is used, baths should be fenced off from stock and also made inaccessible to dogs, which are prone to drink from them when they are round the sheep yards. Cases occur throughout the year, but the greatest number occur in November.

EARLY WEANING OF LAMBS

Where early weaning of lambs is practised on hill country, suitable areas should be spelled early this month for weaned lambs.

Seasonal Notes

By Farm Advisory Division

WEED CONTROL IN CEREALS

FAILURE to spray weedy crops can result in avoidable losses. These losses can arise from either direct weed competition or difficulties in harvesting. Most annual weeds infesting cereal crops can be killed and even if certain perennial weeds such as Californian thistle are not killed outright by a single application, they are controlled to such an extent that they cease to compete with the crop and present no problem at harvest time.

Materials Used

Almost all the weed control spraying on cereal crops is done with either MCPA or the amine salt of 2,4-D. For susceptible weeds such as wild turnip, fathen, and Californian thistle an application rate of between ½ lb and 1 lb acid equivalent per acre is used. If more resistant weed species such as members of the *Polygonum* family (willow weed, cornbind) are present, the amine salt of 2,4-D is used and the rate of application is generally increased to 1 lb or even 1½ lb acid equivalent per acre. A material, 2,4-DP, which will soon be available, is likely to be better than 2,4-D for this purpose, as it is less damaging.

On crops undersown with pasture MCPB may be used to avoid damage to young clovers. Other materials which could be used in special circumstances are 2 (MCPP), or mecoprop or an MCPA-TBA mixture for the control of resistant weeds such as chamomile, cleavers, or chickweed.

Wheat and barley crops are treated with either MCPA or the amine salt of 2,4-D; oats, being slightly susceptible to hormone damage, are more safely sprayed with MCPA; and for maize crops the amine salt of 2,4-D is usually chosen.

Stage of Growth

Wheat and barley may be sprayed from the six-leaf stage to the beginning of shooting. Oats may be sprayed with MCPA from the development of the first true leaf to the shooting stage. Maize can be sprayed safely from the stage of emergence to tasselling.

If MCPB is used on wheat, spraying as early as the one-true-leaf stage is possible.

Application

For cereal crops the spray concentrate is diluted with water, and ground application is made with low-volume boom spraying units, which apply 8 to 12 gallons per acre.

The passage of wheeled machinery over the crop does not normally affect it seriously, but under wet conditions or where spraying is done at a late stage of growth, wheel damage can be considerable. In these circumstances not only is crop yield affected, but maturity of the grain in the wheel-marks is delayed. Consequent uneven maturing and interference with harvesting are undesirable, particularly in malting barley.

Increasing awareness of wheel damage in crops could be the reason why several thousand acres of cereal crops were sprayed by air last season. For aerial application 8 to 10 gallons of water per acre are used to apply rates of weedkiller similar to, or slightly higher than, those used in ground application.

—W. F. LEONARD, Christchurch

LUCERNE VARIETIES

IN recent years lucerne has been established over a wide range of soil types and climatic conditions and is being used in a number of different ways. As a result different characteristics are required of the plants under the various situations and systems of management.

For good lucerne country, where the emphasis is on hay production, there appears to be no better variety than N.Z. Certified, which with its dense growth of fine stems produces a good quality product and makes its maximum growth at a time most suitable for haymaking. For grazing on this type of country Provence is a suitable variety to extend the growth period and still give satisfactory hay production; du Puits and Caliverde also show promise for both haying and grazing. At the Department of Agriculture's Winchmore Irrigation Research Station du Puits has outyielded N.Z. Certified under both dryland and irrigated conditions during the past two years, but is a coarser stemmed variety.

On light land, where moisture is a severe limiting factor during summer, varieties which begin growth early in spring and continue into late autumn are particularly valuable. Varieties in this category which have performed satisfactorily in trials are Provence, N.Z. Certified and uncertified (Marlborough), Caliverde, Italian, and Hunter River. The extreme grazing types have been disappointing on this type of country. Their long winter dormancy and consequent short growing period mean that they are making their main production when limited soil moisture is the governing factor, so that they usually finish up with a low total production. Their use can be recommended only where persistency is a major consideration.

Farmers contemplating sowing lucerne under unusual conditions should ask their local farm advisory officer for advice.

—N. L. SHILLITO, Christchurch

* * *

ROTATIONAL GRAZING OF CALVES

TRIALS at Ruakura have shown that large, well reared heifers will outproduce poorly reared stock in the first two years of milking life.

Regardless of the efficiency of the milk feeding system, calves grazed on a single calf paddock usually show a general unthriftiness as weaning time approaches. To maintain good growth during this period, calves should be rotationally grazed from three weeks of age, so that a fresh grazing area is provided daily. Calves should go into a paddock of leafy feed before the rotationally grazed milking herd. This management not only provides a fresh daily bite of young, leafy, nutritious, and highly digestible feed, but also enables them to graze the most suitable feed selectively. It also reduces worm infestation, since the grazing area is large and the stock concentration is small. General body health of such calves enables them to withstand parasites, so that farmers using this system have found that drenching is seldom necessary.

Though rotational grazing does involve extra work, such as bringing calves to and from their grazing area twice daily for bucket feeding, it has been found that on a well subdivided farm with a central race system the extra effort is amply repaid by the benefits of the system.

—B. A. J. SMITH, Hawera

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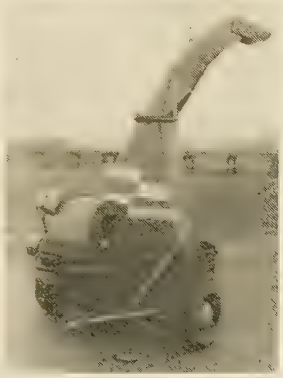

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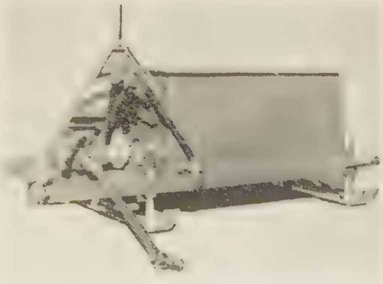

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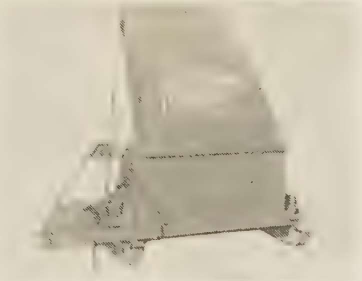

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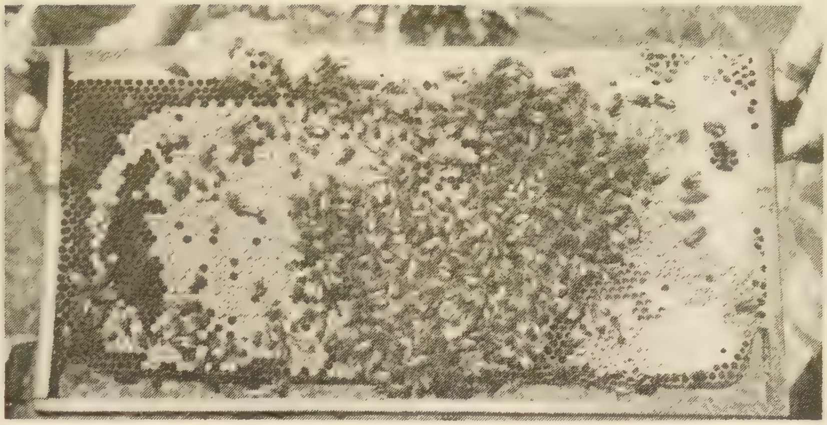
Spring Examination of Hives

Seasonal Notes for the Domestic Beekeeper

By G. L. JEFFERY,
Apicultural Advisory Officer,
Department of Agriculture,
Gore



[Rendell's

A comb showing a good patch of brood (left) and honey supplies (right). This is typical of what should be found during an early spring examination.

EXCEPT where an early flow of bush nectar is likely, or queen raising in early spring is intended, the first examination of beehives is quite early enough in September. During September day temperatures are often quite mild, but chilly evenings and the possibility of robbing make it desirable to close hives as soon as possible. If this September examination is carried out thoroughly and with more purpose than just idle curiosity, it will contribute largely toward the harvesting of a good crop later.

BEFORE other work is attempted the brood must be examined for American brood disease (*Bacillus larvae*). (If there is any doubt about the cause of death of brood, the advice of the local Apiary Instructor is always available.) If American brood disease is found, the hive tool should be sterilised by fire before other colonies in the apiary are examined. Thorough washing of hands, clothing, or other objects to remove honey or propolis is also essential before another colony is touched.

Calcium cyanide can be used to kill bees before burning a diseased hive. Because of the risk involved a person inexperienced with the use of this chemical should use petrol instead. With petrol the entrance is first blocked to prevent the escape of fumes and about a cupful of petrol is poured under the lid. The fumes quickly kill bees, but care is necessary to ensure that the hive is kept away from the fire until the petrol fumes have dispersed.

Once all the bees are home in the evening the colony should be burnt in a hole in the ground. When the material has burnt down, the soil must be replaced in the hole to ensure that no unburnt material is exposed to other bees.

This disease can be present in a colony but not show up in odd cases until about November, and to prevent its further spread combs or boxes should be interchanged between hives only when no disease has been found in the apiary during the past few seasons.

Checking Performance of Queen

The prosperity of a colony depends on the quality of its queen. If a colony lacks brood, has addled brood, drone brood in worker comb, or very patchy brood, it has a failing queen, no queen at all, or a laying worker. A colony in this condition is best destroyed or united to a strong colony, as it is very unlikely to accept an introduced young laying queen and is also probably past raising another good quality queen from its own brood.

At this time of the year, with sufficient stores of honey and pollen available, a good queen should have about three combs of worker brood. If a colony has six or seven combs of brood, it will probably swarm later in the season unless there is a good honey flow during late spring to make use of the large force of workers. This type of colony is very handy to split into two to raise or receive queen cells for replacing failing queens.

The queen should be examined. If her wings are very ragged, she has a shiny body, and has generally lost the sprightly movements of a younger queen, she may fail when the pressure of brood rearing becomes greater. As failure of queens before the main honey flow can result in supersedure, swarming, or a reduced crop of honey being gathered because of a lack of field bees, preparations should now be made to replace aged queens with young ones.

Raising Young Queens

If a young laying queen is not available, it is still early enough to raise one. For the average domestic beekeeper there is little point in going to all the trouble of grafting a full bar of queen cells when only two or three may be needed.

When flying drones are available a small number of good quality queens can be raised by making up a strong queenless nucleus of three or four frames of worker brood and eggs. This nucleus colony should be fed with ample sugar syrup for about a week. Five or six queen cells are usually formed and after eight or nine days these can be carefully cut from the comb and transferred to other prepared nucleus colonies.

The correct time to remove the queen cells is when the bees are starting to bare the tops of the cells in preparation for the release of the queens. One queen cell is transferred to each nucleus, which should consist of one empty comb, one with brood, and one with honey and each of the combs should be well covered with bees. These nuclei can be formed from the cell-raising colony or fresh queenless nuclei can be made up from other hives.

The young queens should be laying in about a month. If three queens are required, four should be raised to allow for any loss during the mating flight.

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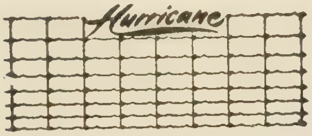

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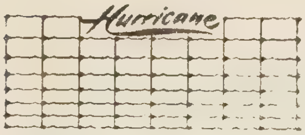

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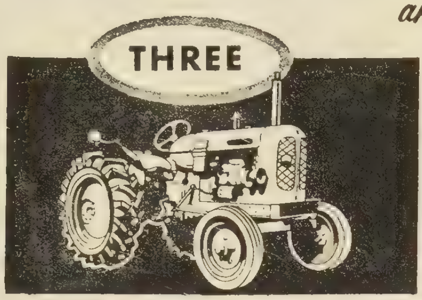

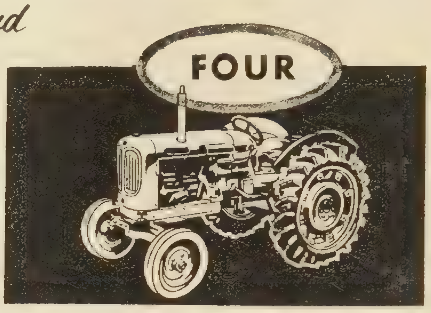

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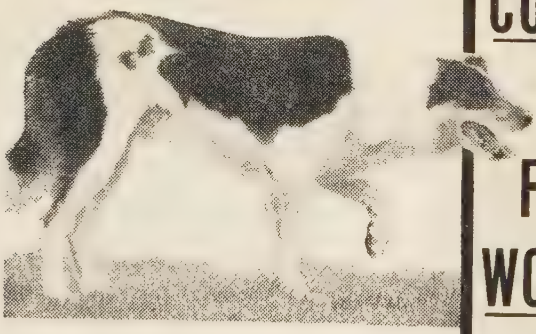

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DOMESTIC BEEKEEPING . . .

When queens are being raised care should be exercised to prevent bees drifting or robbing. Each prepared hive should be blocked at the entrance with green grass for one or two days to allow the bees time to develop a colony morale.

If an old queen continues to lay satisfactorily, her replacement can be left until almost the beginning of the honey flow. The young queen may then be introduced by uniting her colony with the hive containing the old queen. This gives a very strong colony at the ideal time. Though the young queen usually kills the older one, it is a wise precaution to kill the older queen before uniting.

As long as a queen has enough room for three combs of brood in September there is no need to expand the brood nest or otherwise stimulate brood rearing until the following month unless the bees are required for working a main honey flow that occurs earlier than the normal December-January one.

Food reserves should be about three or four combs of honey even in areas where the spring flow is usually good. A full box of honey may be necessary in areas that have little spring flow. Some pollen should also be available, as brood rearing will cease if this becomes short.

Before the brood nest expands empty combs containing excessive drone comb should be removed. If some honey is stored in them, they may be placed at the sides of the box for removal later. If colonies were wintered in two stories, the boxes should not be reversed until next month, as reversal will stimulate brood rearing.

Disadvantages of Hybrid Bee

Though the type of bee generally termed a hybrid may under certain circumstances collect more honey, there are some problems in its use. This type of bee is generally a mixture of the Italian and German races. Its main disadvantages are its general excitability and bad temper associated with a tendency toward swarming greater than is found in pure Italians.

If the colony stings excessively, very few people are willing to put up with the stinging to work it properly. This will generally result in a poorer crop due to partial neglect.

Now is the time to replace these queens with a better quality bee, preferably of an Italian type. Hybrid vigour can be made use of where a good quality type of Italian queen is allowed to mate with a drone from a hive that is of some German black ancestry. This will result in a bee that is reasonably quiet to handle and with some hybrid vigour.

This type of hybrid is normally obtained accidentally and can be used for honey production. It is of no use as a breeder regardless of how good the resultant crop, as hybrid vigour is reduced to normal with inbreeding and the type of bee obtained is not of uniform quality and is very difficult to handle.

Preservative Treatment of Fencing Battens

A RECENT survey disclosed that farmers are still buying fencing battens treated with boron compounds. Boron treatment was promoted and is authorised by the Timber Preservation Authority for the treatment of building timbers which are protected in use from the weather. It is not suitable for the treatment of fence battens and similar timbers which in use are exposed to the elements.

Some sawmillers operating boron treatment plants have found it convenient to dip treat batten timbers because this protects the timber from decay while it is in store at the sawmiller's yard. Bundles of boron dipped battens have still been fresh after two or three years' storage. However, in the fence line the boron salts are washed out in a few years, with the result that boron dipped battens could not be expected to last much longer than untreated ones. Such a performance would not meet the objectives of the Timber Preservation Authority, which by its authorisations tries to maintain a high standard of timber preservation so that treated timber may be marketed and used with confidence. A number of treatments for fence battens which the Authority has authorised can be expected to give an average life of more than 20 years. These are:

Creosote	6 lb per cu. ft.
Pentachlorophenol	6 lb per cu. ft. of a 5 per cent solution in oil
Boliden S25	0.22 lb per cu. ft. anhydrous salt
Boliden K33	0.22 lb per cu. ft. anhydrous salt
Celcure A	0.32 lb per cu. ft. anhydrous salt
Tanalith C	0.35 lb per cu. ft. anhydrous salt
Tanalith CA	0.33 lb per cu. ft. anhydrous salt

Farmers wishing to use treated fence battens are strongly recommended to buy only battens treated in accordance with Timber Preservation Authority requirements.

—*K. M. HARROW,*
Plant Diseases Division, Department of Scientific and Industrial Research, Auckland

World Cereals Production and Consumption

"WORLD production of all cereals now amounts to about 1,000 million tons", said Dr Norman Wright, Deputy Director-General of the Food and Agriculture Organisation of the United Nations, in opening a 10-day meeting of the FAO Group on Grains in Rome in May.

"World trade continues to expand", said Dr Wright. "This year is certain to break new records for wheat shipments, but carry-over stocks in most of the main exporting countries, as well as in some importing ones, will almost certainly be larger at the end of the year than they were at the beginning. Part of these stocks constitutes a potentially valuable world food reserve, but it is clearly desirable that the grains grown should find their way into consumption rather than continue to accumulate in storage beyond the levels needed for such a world reserve".

These grains were the major source of the world food supply, said Dr Wright, and, apart from direct human consumption, "they finished a rapidly growing share—now about half of all grains—of the feeding stuffs needed for the production of meat, eggs, milk, and dairy products".

Study of trends and outlook by the Group was required to guide Governments in formulating national policies and as a basis for international cooperation.

Dr Wright recalled that previous discussions by the Group had indicated two main means for greater consumption of grains. The first, through increased use of livestock products, had grown in a surprising manner. For the other (the provision of more grains as direct food for less-developed countries) there had also been "a striking and previously unparallel development" in the post-war period. The special new feature has been the supply of grains on specially favourable terms to needy countries.

Dr Wright also referred to the impact of heavy increases in the production of grain in the United States and the major importing region, Western Europe. He said that such a shift in the geographical distribution of production would clearly increase the difficulties of traditional exporters. These expectations were based on a complex of factors, one of which was Government policies affecting price relationships, and this was particularly subject to change.

The Group was attended by 40 delegates from 25 countries and the International Wheat Council and 14 observers.

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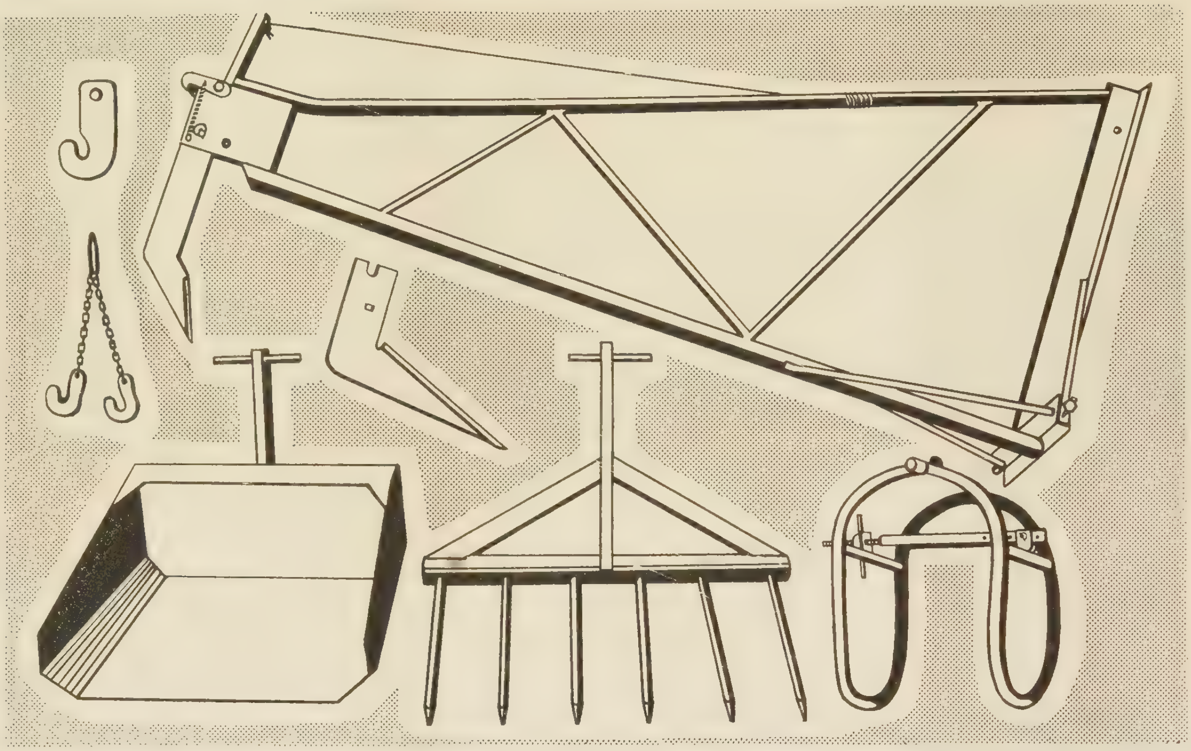

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Increased Overseas Interest

Fourteenth Weed Control Conference

THE papers presented at the fourteenth Weed Control Conference at New Plymouth in July indicated that the many new herbicides developed overseas within the last few years are being intensively investigated in New Zealand. In 24 papers dealing with weed problems in New Zealand, experiments were described in which a total of 60 chemicals had been used. Two other papers dealt with recent developments overseas.

[Kenneth Taylor

Nine of the 10 overseas visitors who attended this year's conference. From the left, front row: Mr T. L. Mune, Department of Agriculture, Fiji, Mr C. D. Goodchild, Sydney, Mr D. S. Fox, Sydney, Dr W. J. Woodman, Singapore, Dr W. R. Mullison, Michigan. Back row: Messrs B. J. Hall, New South Wales Department of Agriculture, K. Bridge, Pennsylvania, P. Gregory, Sydney, J. Snelson, Sydney. Absent is Mr A. Rogers, Sydney.

THE value of the conference was enhanced by the attendance of 10 overseas visitors. New Zealand research workers were able to learn more about recent developments overseas and were thus able to plan to greater advantage their experimental programmes for the forthcoming season.

Though intensive investigations are being conducted with new materials, there is no great difference of opinion among research workers, advisory officers, manufacturers, and distributors regarding the use of the commercially available weedkillers. This situation has largely resulted from all sections meeting and exchanging information at the annual conferences.

Many people in commercial firms and Government departments would like to see a similar stimulation of research and a like unanimity of opinion with insecticides and fungicides, and a conference to deal with these subjects had been suggested.

Since most of those who attend the Weed Conferences are also interested in insecticides and fungicides, the subject was discussed at the annual meeting and it was decided that the next conference should be extended by a day to enable papers on these subjects to be presented.

Of the overseas papers one was given by K. Bridge, of Amchem, Pennsylvania. Mr Bridge dealt with methods of evaluating his company's compounds. The other overseas paper was given by P. Gregory, of Geigy Ltd., Sydney. Mr Gregory dealt specifically with a group of new herbicides that could play a big part in solving problems to which to date there was no satisfactory answer. The herbicides he discussed, the triazines, will be suitable for use in maize, carrots, and celery. They show promise for weed control in field brassicas and have a wide use for horticultural crops.

New Officers

THE officers elected for the ensuing year were: president, F. C. Allen, Christchurch; past president, J. N. Fitzgerald, Wellington; vice-president, F. B. Thompson, Hamilton; secretary, L. J. Matthews, Wellington; treasurer, G. R. Marlow, Wellington; committee: A. R. Dingwall, Christchurch, P. S. Ferens, New Plymouth, M. S. Foreman, Christchurch, P. B. Lynch, Wellington, R. L. Taylor, Nelson, and A. J. Tuckett, New Plymouth.

A. J. Healy, Assistant Director, Botany Division, Department of Scientific and Industrial Research, Lincoln, gave a very academic paper on the identification of clovers. His paper included the identification of some 30 species of clover-like plants and will be an invaluable reference for years to come.

W. M. Houlker spoke of endeavours to find a satisfactory weedkiller for control of submerged aquatics. This type of weed growth is normally difficult to control and the preparation acrolein which has proved highly successful overseas has not proved so under New Zealand conditions.

The paper by G. R. Moss outlined the weed problems of Taranaki. He said, "The history of farming in Taranaki is the history of the fight to control weeds". He quoted from an article in the "Taranaki Herald" of 1910: "With regret we learn that noxious weeds, especially blackberry and ragwort, are rapidly gaining ground in some parts of the Province. There are some farms, we are told, which are becoming impenetrable thickets of blackberry, while the grazing capacity of others has been largely

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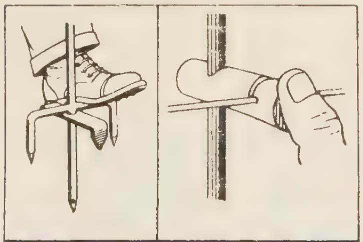

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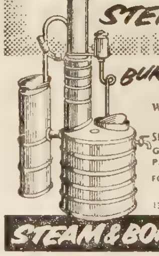

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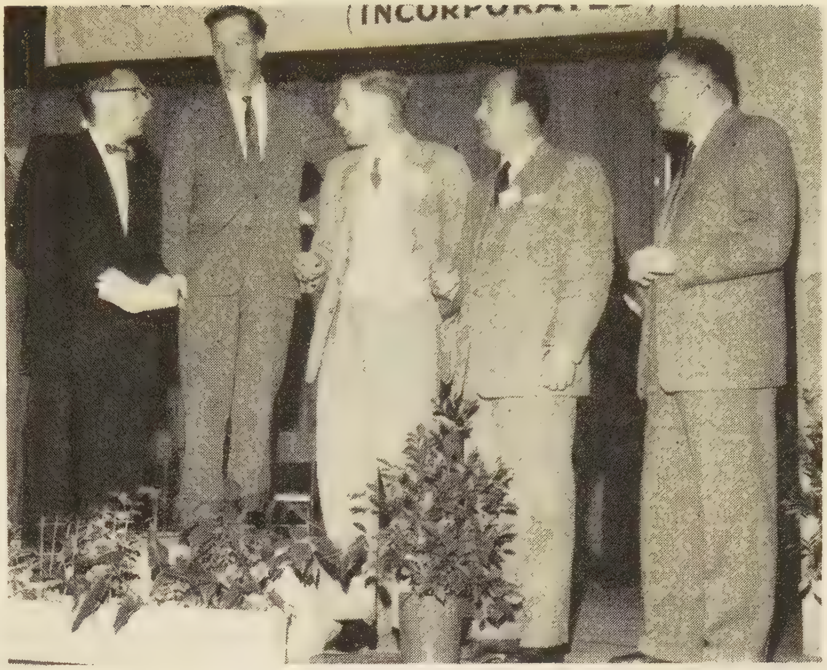

[*Kenneth Taylor*

An innovation at the conference this year was the division of most of the papers into sessions, the papers in a particular field being dealt with under a discussion leader. Above is the group of authors who gave papers in the soil sterilants session, with the discussion leader, Mr J. N. Fitzgerald, second from the left. The others in the group from the left are: Dr G. W. Mason and Messrs A. B. Webster, A. Wratislav, and D. C. Isaacs.

reduced on account of the spread of this and of ragwort."

Mr Moss considered that the weed problems of Taranaki have been aggravated by the low natural fertility of the soils and the high and evenly distributed rainfall. "Gorse", he said, "has become a major problem due to early plantings of hedges and lack of farming pressure brought about often by unsatisfactory land tenure. Much of the coastal land where gorse gets out of control is leasehold land." In concluding, Mr Moss said, "We now have a selection of safe chemical weedkillers that will control the majority of our weeds; but these chemicals are not a substitute for good farm management practices."

The remaining papers were grouped into sessions—chemical ploughing, soil fumigation, soil sterilants, pasture weeds, machinery, and crops. Instead of the normal procedure followed in previous conferences of authors reading papers at the conference, a discussion leader appointed for each session reviewed papers, copies of which had previously been sent to members. The reviewer summarised and criticised the papers and indicated the main points for discussion. This system enabled more papers to be dealt with in the time allowed.

Chemical Ploughing

The term "chemical ploughing" is a misnomer, but is commonly used because there is no other suitable abbreviation for the process, which may be defined as "establishment of pasture or crops after destruction of the previous sward with chemicals instead of by cultivation". A paper by L. A. Porter outlined experiments in which strawberries had been successfully grown after chemical ploughing.

L. W. Blackmore's paper showed how low-producing hill country pastures in the Dannevirke district had been replaced by more highly producing swards by spraying with chemicals and subsequently oversowing. Both the chemicals and the grass seed had been applied by aeroplane.

P. Bramley summarised the experimental work conducted to determine the most suitable weedkillers to use for chemical ploughing. A new material, paraquat, had considerable promise because it had no residual toxic effects and for this reason may replace dalapon to some extent. Unfortunately paraquat appeared unsatisfactory for the control of browntop in autumn. The papers listed advantages and disadvantages of the chemical method which, though it is promising, is still in the experimental stages.

Soil Fumigation

In the soil fumigation session A. J. McNeur stated that, "Apart from the killing of weeds and most weed seeds, all the main fumigants are toxic to fungi, bacteria, and insects, though some are more toxic to certain species than to others. This clean-up of the soil is not usually as complete as that from good steaming, but is usually adequate for all practical purposes." He quoted experimental results which showed that weed seeds were killed by a number of fumigants (MB, allyl alcohol, SMDC, DMTT, and DD).

Proceedings

PRINTED proceedings of the conference, containing all the papers and discussions, may be obtained for 15s. a copy from the Secretary, Weed Control Conference, Department of Agriculture, P.O. Box 2298, Wellington.

J. P. Salinger stated that some of these materials are widely used by nurserymen for weed control. He said, "The production of plants for sale is a very specialised form of horticulture, requiring a high degree of technical knowledge and involving a considerable amount of hand labour and mechanical cultivation. The plants being produced by a nursery may include seedlings, bulbs, shrubs, ornamental and fruit trees, and forest trees. . . . Chemicals can provide a great saving in time, labour and costs in the production of nursery stock. In one nursery one application of a weedkiller plus two hoeings replaced six hoeings. Both experimentally and on a field scale results have proved variable. Used correctly with suitable soil and weather conditions, excellent weed control has been obtained with no plant damage, but at other times weed control has been unsatisfactory and phytotoxicity observed. Phytotoxicity is, of course, a major factor and when one realises that one nurseryman may grow 3 000 varieties of plants and that there could be varietal susceptibility to the materials it can be realised that no cut and dried recommendations can be made and that each producer's problem must be examined separately."

In stressing the importance of teaching nurserymen how to use the weedkillers, Mr Salinger said, "These materials are something new to nurserymen, they are used in a different manner from therapeutants, and their application must be understood

[*Kenneth Taylor*

The conference president, Mr F. C. Allen, right, and secretary, Mr L. J. Matthews.

before they are used. Operators must be trained, sprayers calibrated, and plant, soil, and weather conditions must be correct before the materials are applied."

New Chemicals

The number of new chemicals mentioned in the sessions on soil sterilants and weed control in crops showed that the problems were becoming complex. Of 12 new triazine chemicals mentioned, simazine was the most promising for non-selective weed control. However, neither simazine nor several other new materials controlled a sufficiently wide range of weeds to be satisfactory in all conditions. It was concluded from the papers presented that it is uneconomic to use expensive soil sterilants to kill standing vegetation. It is better to use a "knock-down" treatment such as a dalapon-amitrole mixture and follow up with a sterilant to prevent reinfestation of the area.

Selective weed control in crops is even more complicated. The aim is to find chemicals which are toxic to a wide range of weeds at rates not damaging to the crops. Usually the difficulty is that there are some species of weeds which are not controlled by the maximum rates of chemicals tolerated by the crops.

The papers presented in the crop session showed that the results obtained depended to some extent on whether weeds were present which were resistant to the chemicals used. For instance one paper stated that propazine controlled a wide range of weeds in carrots, but another author found that propazine was of little use if crabgrass (*Digitaria sanguinalis*) and witch grass (*Panicum capillare*) were present. A third paper showed that simazine and atrazine were unsatisfactory for the control of these two grasses in a maize crop, whereas a fourth paper found that atrazine gave excellent control of barnyard grass (*Echinochloa crusgalli*) under moist conditions. The choice of the weedkiller to use in any particular situation depends not only on the crop, but on the kinds of weeds likely to be troublesome.

The discussions on the results obtained in various parts of New Zealand, under different soil, climate, and weed infestation conditions were of considerable value. The pooling of such information from both Government and commercial sources lead to sound recommendations regarding the use of weedkillers.

Next Conference

The next conference is to be held at Christchurch in July 1962.

—*F.B.T.*

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during June 1961 and for the 11 months ended 30 June 1961 with comparative figures for the same month and the 11 months of 1959-60 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
June 1961	281	11	292	—
June 1960	300	15	315	—
Decrease	—19	—4	—23	—7.301
11 months ended 30/6/61	161,725	3,182	164,907	—
11 months ended 30/6/60	158,690	2,977	161,667	—
Increase	+3,035	+205	+3,240	+2.004

Butter in store at 30 June 1961 was 17,095 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage increase
June 1961	944	—	944	—
June 1960	703	—	703	—
Increase	+241	—	+241	+34.281
11 months ended 30/6/61	80,912	12,280	93,192	—
11 months ended 30/6/60	75,766	11,316	87,082	—
Increase	+5,146	+964	+6,110	+7.016

Cheese in store at 30 June 1961 was 19,072 tons

If these figures are converted into butterfat equivalent, there is an increase of 2.982 per cent in butterfat graded for the 11 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export and do not include butter and cheese used on the local market and other products such as anhydrous milk fat, whole milk powder, and other whole milk products, and are not necessarily a true indication of production trends.

Reducing Losses of Piglets

FEWER than 10 pigs per sow per year are marketed in New Zealand, whereas it is possible by applying available knowledge to market at least 16. A principal weakness in pig keeping is heavy losses of young pigs.

Various ways of reducing such losses are discussed in Department of Agriculture Bulletin No. 405 "Methods of Reducing Piglet Mortality". The author is D. M. Smith, who until he resigned last March was in charge of pig research at Ruakura Animal Research Station for many years.

Copies of Bulletin No. 405 are available free from offices of the Department of Agriculture.

Radio Broadcasts for Farmers

RADIO broadcasts for farmers will be given during October as follows:

1XH Hamilton, 12.33 p.m.

9 October—"Insect Damage to Waikato Pastures", by J. D. Currie, Farm Advisory Officer, Department of Agriculture, Hamilton.

16 October—"Pig Matters", by R. T. Davis, Federated Farmers.

30 October—"Farm Water Supplies", by J. L. Doutre, Machinery Instructor, Department of Agriculture, Hamilton.

1YZ Rotorua, 7.15 p.m.

11 October—"Young Farmers' Clubs", by Matamata Y.F.C. district committee.

25 October—"Topical Notes for the Farmer", by S. R. Hewitt, Farm Advisory Officer, Department of Agriculture, Whakatane.

2XP New Plymouth, 8 p.m.

5 October—"News and Views from the Farm Advisory Division", by C. Christie, Farm Advisory Officer, Department of Agriculture, Stratford. Peter Weenink's Y.F.C. session.

19 October—"Animal Husbandry Notes", by A. R. Murdoch, Livestock Instructor, Department of Agriculture, Stratford.

26 October—"Radio Vet.", by J. H. Macdonald, Veterinarian, Department of Agriculture, New Plymouth.

2XA Wanganui, 8 p.m.

5 October—"For the Country Women", by Mary Macdonald.

12 October—"Farming News".

19 October—"Winter Feeding in Waimarino", by A. D. Mercer, Fields Instructor, Department of Agriculture, Wanganui.

26 October—"Sheep and Wool Field Notes", by P. C. Marshall, Sheep and Wool Instructor, Department of Agriculture, Wanganui.

2YZ Napier, 7.10 p.m.

3 October—"Spring Management of Bees", by L. J. S. Line, Apiary Instructor, Department of Agriculture, Hastings.

17 October—"Stock Problems", by J. G. Niccol, Livestock Instructor, Department of Agriculture, Hastings.

31 October—"Topdressing and Management", by H. J. Jagger, Farm Advisory Officer, Department of Agriculture, Hastings.

2XG Gisborne, 8 p.m.

3 October—"Crops for Control of Facial Eczema", by T. A. Sellwood, Farm Advisory Officer, Department of Agriculture, Gisborne.

10 October—"For the Orchardist", by J. Overbye, Horticultural Instructor, Department of Agriculture, Gisborne.

17 October—Session by Gisborne Veterinary Club.

24 October—"Is Your Haymaking Machinery Ready to Start?", by R. S. Whitehead, Fields Instructor, Department of Agriculture, Gisborne.

31 October—"Stockowners' Question Time", by E. B. Smythe, Livestock Instructor, Department of Agriculture, Gisborne.

2XB Masterton, 6.45 p.m.

13 October—"Wool", by I. Thomas, Sheep and Wool Instructor, Department of Agriculture, Wellington.

3YA Christchurch, 12.20 p.m.

2 October—"Potato Growing with Reference to New Varieties", by R. G. Jolly, Instructor in Agriculture, Department of Agriculture, Christchurch.

4YA Dunedin and 4YZ Invercargill, 12.36 p.m.

2 October—"Pasture Utilisation", by G. L. Banfield, Assistant Fields Superintendent, Department of Agriculture, Dunedin.

9 October—"Wool Handling", by W. J. Hansen, Sheep and Wool Instructor, Department of Agriculture, Dunedin.

16 October—"Common Diseases of the Turnip and Swede Crop", by J. C. Butel, Farm Advisory Officer, Department of Agriculture, Dunedin.

30 October—"Recent Developments in Fruit Research", by D. W. Wilson, Horticultural Instructor, Department of Agriculture, Roxburgh.

Regular Sessions

1YA Auckland, Mondays at 12.36 p.m. ("Country Journal", including "Report from Ruakura"), Tuesdays, Wednesdays, Thursdays, and Fridays at 12.33 p.m. ("Country Journal"), Thursdays at 12.33 p.m. ("News for the Farmer").

1XN Whangarei, Mondays at 8 p.m. ("Northland Stock Market Report", followed by "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 12.33 p.m. ("Farm News").

1XH Hamilton, Mondays at 12.36 p.m. ("For the Farmer", excluding first Monday in month and public holidays), Wednesdays at 12.33 p.m. ("Report from Ruakura").

1YZ Rotorua, Wednesdays at 7 p.m. ("Bay of Plenty Journal"), Thursdays at 12.33 p.m. ("News for the Farmer").

2YZ Napier, Tuesdays at 7.10 p.m. ("The Hawke's Bay Farmer"), and Thursdays at 12.33 p.m. ("News for the Farmer").

2XG Gisborne, Tuesdays at 8 p.m. ("Farm Session").

2XP New Plymouth, Thursdays at 8 p.m. ("Farm Session").

2XA Wanganui, Mondays at 8 p.m. ("For the Man on the Land"), Tuesdays at 8 p.m. ("Farm Supplement"), and Thursdays at 8 p.m. ("Farm Topics").

2XB Masterton, Wednesdays at 6.45 p.m. ("Masterton Stock Market Report"), Fridays at 6.45 p.m. ("Farm Session").

2XN Nelson, Thursdays at 8 p.m. ("Nelson Farm Topics").

2ZA Palmerston North, Mondays at 12.36 p.m. ("Country Digest"), and Fridays at 8.30 p.m. ("Country Digest", including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m. ("Farm Session"), Thursdays at 12.33 p.m. ("News for the Farmer").

3YA Christchurch, Mondays at 12.20 p.m. ("Country Session"), Thursdays at 12.33 p.m. ("News for the Farmer"), and 7.10 p.m. ("Home Paddock").

3XC Timaru, Wednesdays at 8 p.m. ("Farmers' Weekly News Service"), and Saturdays at 10.30 a.m. ("Country Mailbag").

3YZ Greymouth, Mondays at 12.36 p.m. Thursdays at 12.33 p.m. ("News for the Farmer").

4YA Dunedin, Mondays at 12.36 p.m., Tuesdays at 12.33 p.m., Wednesdays and Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.36 p.m., Wednesdays and Thursdays at 12.33 p.m ("News for the Farmer").

Prevent Wireworm Attack in Maize

WIREWORM attack can drastically reduce the number of plants in a young maize crop, particularly in areas ploughed out of grass.

Once the maize is sown it is too late to take any protective action except at prohibitive cost, so that if wireworms in dangerous numbers are suspected, control measures should be undertaken at sowing.

Treating the seed with insecticide is not a sufficient safeguard, as the pest often attacks the young plant well above the level of the planted seed and so out of reach of any chemical applied.

A simple method of applying insecticide in the row at planting time is to use an ordinary low-volume spray pump mounted on the tractor. A plastic hose lead with a suitable nozzle is led to each shoe of the planter. The nozzle is attached in such a position that it sprays into the soil as it lies open to receive the seed. If possible, both walls as well as the bottom of the planting furrow should receive a share of the insecticide so that as the furrow closes there will be a continuous vertical impregnated band from seed level to soil surface.

Forty per cent aldrin at 1½ pints per acre is recommended. Under average conditions this should be diluted in 8 gallons of water per acre. To adjust the mixture to suit average speed a useful guide is that if maize is planted in 3 ft rows, there are 220 chains of row per acre.

—*G. J. GRAHAM,*
Department of Agriculture,
Gisborne

Controlling Ragwort

EXTENSIVE trials over several years have shown that the low-volatile ester of 2,4-D is generally the most efficient material to use on ragwort. Application to young ragwort plants in late August-September at a solution concentration of 1 to 1½ lb acid equivalent per acre to 25 gallons of water will result in good control of seedlings and root-tip growths.

Similar treatment during November, after the area has been hard grazed with cattle (not sheep), will account for most of the older and mature plants. Spot treatment of individual plants from then on will usually keep once heavily infested areas comparatively free from ragwort.

To keep possible clover damage to a minimum do not exceed the recommended amount of hormone per acre, but the quantity of water used may be varied to achieve complete coverage of foliage.

Remember that a slow, steady kill is more desirable than a quick knockdown, which though perhaps more spectacular, is not lasting. Always choose fine weather for spray treatment.

—*C. R. TAYLOR,*
Instructor in Agriculture,
Department of Agriculture,
Rotorua

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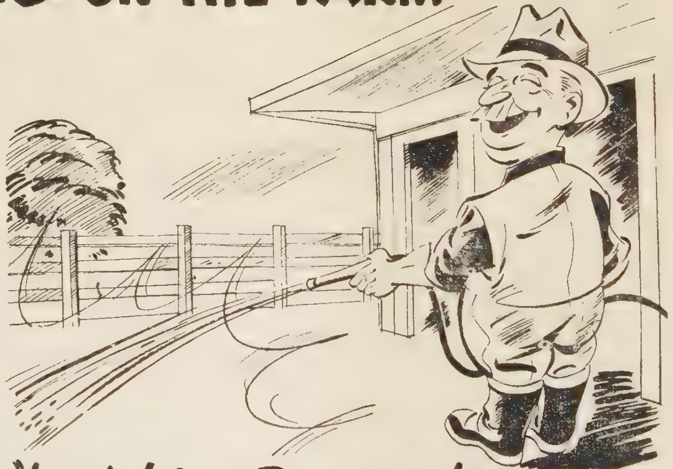

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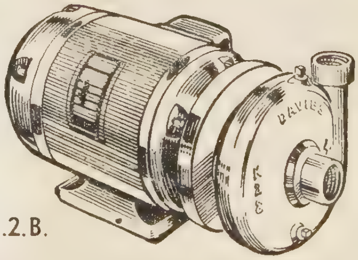

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Vegetable Growing for Home and Market Gardeners

Lettuces

By A. G. KENNELLY,
Horticultural Instructor, Department of Agriculture, Dunedin

LETTUCES are grown in most home and commercial gardens in New Zealand and many commercial growers specialise in them. The range of varieties suited to different conditions is such that they can be grown in most areas all the year round. However, good soil and growing conditions are needed to grow lettuces well. Even in the warmer districts growth is better during the coldest months if the crop is grown under cloches or in a specially favoured site.

LETTUCE (*Lactuca sativa* L.) thrives in moist, fertile, well drained soils. If suitable varieties are chosen, it is possible in most districts to harvest them throughout the year. Winter production is generally more difficult and in most districts the more favoured areas are preferred for it. Plant breeders have produced varieties suited to specific conditions. Some varieties are suited to cool conditions and some varieties are well adapted to hot, dry conditions. The latter are a particularly favourable development, because it is in the warmer weather that lettuce is so popular as a salad vegetable. As lettuce is eaten raw, it loses little of its food value during preparation for the table.

Culture and Soil

Lettuces tend to be tough and stringy if grown slowly; if checked, they may make poor growth afterward and fail to heart properly. They should therefore be encouraged by weed control, good drainage, adequate cultivation, and a suitable supply of plant foods to make rapid growth. Cultivation and aeration of soil are very important in maintaining maximum soil temperatures in winter, and on land which tends to be wet and cold it is advisable to grow plants on ridges or raised beds.

The soil should be rich in organic matter and weed free. As the seed is small and requires light for germination, cultivation before sowing should be thorough. Lettuce needs a constant and fairly high degree of soil moisture from seeding to harvest, as wide fluctuations are liable to cause the plants to go to seed prematurely or to be of poor quality. Plants may not heart well and are usually tough and bitter when growing conditions are poor.

The soil should never be wet for any length of time after rain or watering; it should drain quickly so that it is soon freely workable. However, its moisture content should never get so low that more than the surface is dry. Such exacting conditions make lettuce growing in hot, dry areas very difficult without irrigation.

Lime

A slightly acid to medium acid soil suits lettuce. The best soil reaction is pH 5.8 to 6.6. In highly acid soils lime is needed, but liming heavy enough to bring the soil to a neutral or alkaline condition may depress yield and induce chlorosis.

USUAL DISTRICT LETTUCE-GROWING PRACTICES AS NOTED BY HORTICULTURE DIVISION INSTRUCTORS

	VARIETIES; SOWING AND PLANTING TIMES	FERTILISERS
AUCKLAND	**Seed** Great Lakes, Imperial 847: late August-January Great Lakes (cool-weather strain): January-February Triumph Imperial 615 (black seeded): February-August **Transplants** Great Lakes: Beds sown early September-early February Triumph: Beds sown mid February-April. Plants are raised in glasshouses in boxes sown in May, June, and July Imperial 615: Beds sown May-June Transplanted when plants are big enough. Usually mosaic indexed, tested, or Australian-raised Great Lake types are grown	Fertilisers vary greatly among growers and may range from about 10 cwt to 2 tons of a mixture or 2 to 3 tons of blood and bone. Winter dressings are usually lighter than summer dressings. Side dressings are given by many growers and may range from 3 to 5 cwt of dried blood per acre to 2 to 3 cwt of sulphate of ammonia or nitrate of soda per acre or 5 cwt per acre of a proprietary mixture high in nitrogen. In winter 3 cwt of nitrate of soda or 2 cwt of sulphate of ammonia per acre is used, or urea as a foliar spray at 5 lb per acre
PUKEKOHE	Summer growing: Great Lakes Winter growing: Triumph (most popular), Imperial 615 Lettuce may be sown throughout the year. Summer (sown direct): Early September-early February (mature in eight to 12 weeks according to conditions) Winter (sown direct): Mid February-early April and again mid August-September. Winter (sown in beds and transplanted): April-July. May sowings take longest (four and a half to five months) to mature. Site should be warm and sheltered (cloches desirable), as plants take about eight weeks to reach planting size	A commonly used mixture contains 35 per cent of serpentine superphosphate, 35 per cent of blood and bone, 15 per cent nitrate of soda, 10 per cent of sulphate of potash, and 5 per cent of dried blood. Nitrate of soda may be omitted and used as a side dressing. Ammonium nitrate-lime mixture is used to some extent, but summer crops do not usually need side dressing
HAWKE'S BAY	Imperial 615, Triumph, Great Lakes, Webbs Wonderful, Winter Lakes. Mainly drilled in field, thinned later. Few transplanted Summer varieties: September-October Winter varieties: April-May	Base dressings of compost or similar material may be applied at 10 to 15 cwt per acre with blood and bone at 4 to 5 cwt per acre as needed or a complete fertiliser at 4 to 5 cwt per acre or superphosphate at about 4 cwt per acre may be applied according to soil fertility. Side dressings may be a proprietary complete fertiliser or nitrogenous fertiliser
PALMERSTON NORTH	Summer: Great Lakes Winter: Triumph Sown practically all year round; for winter lettuce March-May is the main sowing time. Early winter lettuce is usually sown direct; thinnings may be transplanted. Early winter (March) sowings are usually in beds	Fertiliser dressings vary considerably. Blood and bone is widely used at about 1 ton to the acre. In Wanganui, especially on the lighter areas, fowl manure and straw are used. A cover crop only may be ploughed in. Side dressings may be of dried blood, ammonium nitrate-lime mixture, or urea. Urea is also sprayed on by some growers
LEVIN	Autumn-winter sowing: Triumph Spring-summer: Great Lakes Seed sown under glass in May, June, and July, but otherwise outside	The base dressing is commonly 1 to 2 tons of blood and bone; side dressings of dried blood at up to 1 ton or amounts of other fertilisers supplying an equivalent amount of nitrogen are given
WELLINGTON	Spring: Triumph Summer: Summer Gem Autumn: Webbs Wonderful Winter: Imperial 615, Triumph Sown from August to April at regular intervals; in seedbeds, except November to February, when seed is sown direct in the plant rows	Blood and bone at 1 ton to the acre is most often used as the base fertiliser. In summer 2 cwt per acre of a quick-acting nitrogenous fertiliser is used. In winter one or two dressings of nitrate of soda at 1 cwt per acre are given

	VARIETIES; SOWING AND PLANTING TIMES	FERTILISERS
NELSON	Lettuce can be grown all year round, but winter cropping is more difficult. Some glasshouse tomato growers grow small areas; plants are sown from the third week to the end of April and in succession under glass in boxes of sterilised soil, pricked out in about three weeks, grown on for about three weeks, and hardened for about three weeks before setting out Triumph, Imperial 615, and Webbs Wonderful mainly are used for late winter or early spring planting. Other varieties grown include Yatesdale, Great Lakes Regular, Imperial 847 (black seeded), All the Year Round Under cloches: Late March, Triumph; mid to end May, New York; later, Great Lakes (seedlings raised in boxes under glass)	Dried blood (sometimes blood and bone) may be applied heavily in bands before planting. A mixture of 3 parts of dried blood and 1 part of sulphate of ammonia has also been used, though some growers have had poor hearting with this mixture. Side dressings may be applied, dried blood being widely used
CHRISTCHURCH	Most crops are sown direct successionally through spring, summer, and autumn. Crops for winter and early spring in the Port Hills area are mainly sown in the field in late March and April. Some are transplanted and sown from March on. On the plains seed is sown in boxes in April-May for June-July transplanting for spring-maturing crops to follow Port Hills crops	Fowl manure is widely used at up to 20 tons to the acre alone or, where necessary, supplemented with side dressings. These may be dried blood, particularly for summer crops, or ammonium nitrate-lime mixture or sulphate of ammonia, which are commonly used for winter crops. Nitrate of soda is favoured by some growers, particularly to boost early spring crops. Commercial fertilisers are rarely used in the base dressing because of the large amounts of fowl manure commonly applied. The extent to which side dressings are made and the rate of application depend on the quantity and quality of fowl manure in the base dressing. For glasshouse crops fertilisers are not generally used, as residues of fertiliser from the previous tomato crop supply enough for the lettuce
DUNEDIN	Summer: Great Lakes, Webbs Wonderful Winter: Triumph, Webbs Wonderful, Imperial 615 Spring: Great Lakes 659, Webbs Wonderful, Triumph Sown direct in field rows and in nursery beds from August to February and in nursery beds or frames or cloches from February to August. Set out when large enough	Blood and bone at up to about 16 cwt to the acre; fowl manure at about 10 tons to the acre; or 4 to 6 cwt of a complete fertiliser with or without organic matter

---

Planting and Sowing

Direct seeding rates vary from 1 lb to 3 lb per acre. For sowing in beds or boxes or frames ½ lb to 1 lb is usual. Seed is usually sown in rows 12 to 15 in. apart with a wheel seed sower, though on large areas multiple row seeders of various types may be used to sow several rows at a time and rows may be up to 26 in. apart. Field-sown plants are thinned to 10 to 18 in. apart according to variety and growing conditions.

In frames, seed is usually broadcast, but in seedbeds it may also be drilled in rows 6 to 9 in. apart. Plants are usually set out 12 to 15 in. apart with a garden trowel or small bricklayer's trowel or the planter may crawl along rows using a special short-handled chop hoe.

Beds are marked with a wooden marker like a large rake consisting of pegs nailed to a cross-bar to which is attached a handle. Field beds may be from 2 to 16 rows wide and the plants may be equidistant or the rows may be wider apart than the plants in the rows. Plants are sometimes grown on ridges or on raised beds to take advantage of the improved drainage or improved temperatures there.

The depth at which lettuce seed should be sown depends on the texture of the soil and its water-holding capacity. Seed will fail if sown too deeply. It should be sown as shallow as possible and yet covered and kept moist; ¼ in. is usually enough. If deeper sowing is necessary, it should not be more than ½ in. Mechanical seeders must be adjusted to drop the seed accurately and at the proper depth.

Weed Control

Most growers use wheel hoes and push hoes for weeding. Powered implements can be used where rows are wide, but hand hoes are used round the plants. CIPC at 2 to 4 lb of active ingredients per acre has been used before emergence of seedlings, but heavy rain after application may damage the crop. This weedkiller has also given satisfactory control of weeds on planted-out areas.

Irrigation

Wide fluctuations in soil moisture should be avoided; it may be very damaging to lettuces in the late stages of development. The soil should be wet enough for only a short time after irrigation or rain to hold together when squeezed, but the soil moisture should not get so low that more than the surface gets dry.

Many growers irrigate crops with sprinklers, though overhead standpipes are sometimes used.

Some specialist lettuce growers have built up the organic matter content of their soils with heavy applications of composted straw, fowl manure, or any other form of organic matter to allow a heavy rate of overhead irrigation to be used and so reduce the period the crop is kept wet. Because conditions are rarely suitable for it, field flooding is seldom used, but on well drained land it is an effective way of irrigating lettuce.

Yields

Average yield of lettuce per acre is difficult to assess because the crop is

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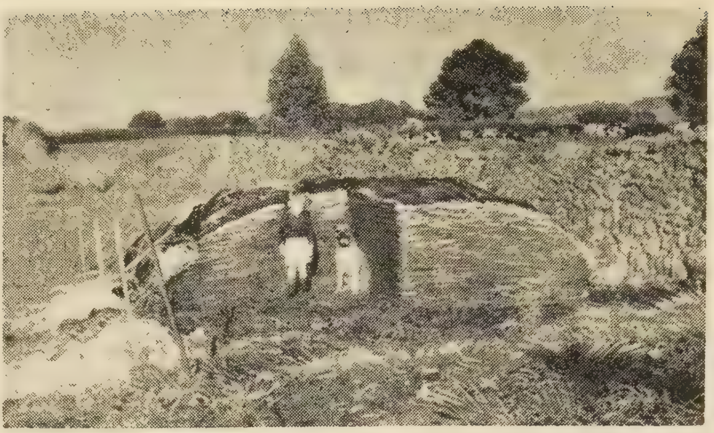

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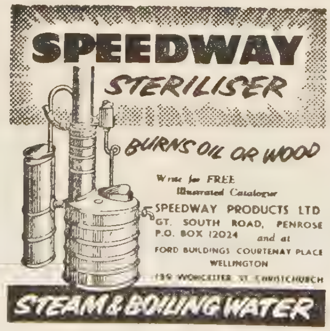

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not marketed by weight and because in most crops many heads are not cut owing to disease, immaturity or over maturity, low prices, off types, and other reasons. Most growers are satisfied if they can market 90 per cent of a large planting.

Summer crops are usually heavier than early spring ones, because the plants heart better and grow larger and heavier. Good crops may yield 10 to 12 tons to the acre and poorer or early crops 3 to 5 tons to the acre.

Harvesting and Marketing

Lettuces are usually cut with a knife, damaged or loose outside leaves are removed, and heads packed in containers in the field. Banana cases mainly are used, but early in the season lettuces may be marketed in apple and pear cases. Banana boxes hold from about 12 to 42 lettuces according to their size.

Important Pests and Diseases

Downy Mildew

Downy mildew is caused by a fungus (*Bremia lactucae* Regel) that may attack lettuce plants at any stage of growth. The first indications are usually scattered light green to yellowish areas $\frac{1}{2}$ to $\frac{3}{4}$ in. in diameter on the upper sides of the leaves. Later, patches of downy white mycelium show on the lower surfaces of the affected areas and spores are developed there. The patches may coalesce and the older parts die.

The disease is carried over in the soil and on plant refuse from one season to the next, and during the growing season it is spread by airborne spores and by rain splashing from infected plants.

Crop refuse and volunteer lettuce should be destroyed. Affected plants in boxes or in seedling beds should be sprayed with copper oxychloride (5 lb per 100 gallons) or with freshly mixed 3 : 4 : 50 bordeaux spray or zineb (2 lb per 100 gallons). Further sprays may have to be applied to the plants in the field.

Under glass, soil should be well drained and not too wet and ventilation should be given to reduce humidity round the plants. Spraying may be needed.

Ring Spot or Rust

Ring spot or rust is caused by the fungus *Marssonina panattoniana* (Berl.) Magn. The main ribs of the oldest leaves near ground level are affected first with slightly sunken, yellow, circular or angular spots up to $\frac{1}{8}$ in. in diameter. These later turn brown and spread along the leaf stem, often splitting slightly, the damage appearing like that done by insects. Many spores form and cause secondary infections. Spots may coalesce and irregular patches of dead tissue may later fall out, giving a ragged, shot-hole appearance.

▲ During the colder months it is preferable to raise plants under glass.

▼ Plants grown in open nursery beds. For these the soil is usually raised about 6 in. to improve drainage and soil temperature and aeration.

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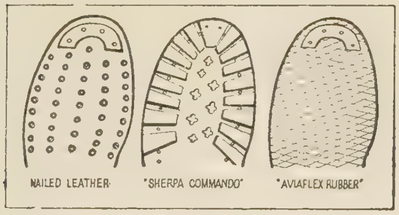

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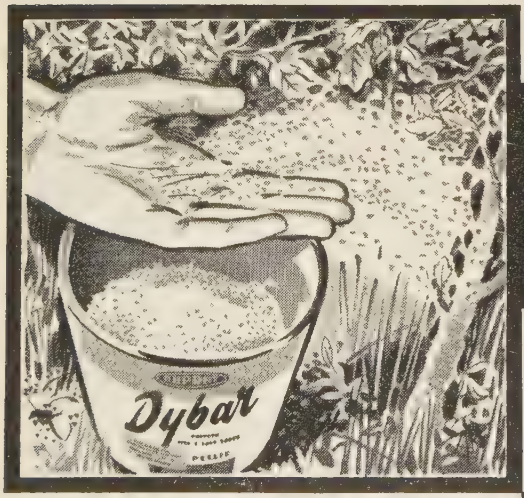

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Some form of irrigation is essential for summer lettuce crops. Heavy individual waterings are preferable so that leaves do not remain wet for too long.

The disease spreads rapidly from centres of infection in the seedbed and may cause areas of plants to die. In the field, if infection occurs early, some plants may be killed, but usually they remain stunted and useless for marketing.

The disease is carried over in the soil and on infected rubbish. In the growing season infection spreads rapidly through rain splashing spores about. Severe infection is favoured by wet weather, high relative humidity, and relatively low temperatures.

Control consists of the destruction of infected rubbish and infected plants in the seedling bed. Lettuce should not be set out on land on which recently there has been an infected crop. As the disease is seed borne, seed should be dusted with a fungicide such as thiram, captan, or zineb. Plants from the seedbed stage onward should be dusted with 6 per cent captan or sprayed with 50 per cent captan at 2 lb per 100 gallons.

Big Vein

Recent research indicates that big vein disease of lettuce is caused by the fungus *Olpidium brassicae* (Wor.). The most prominent symptom is yellowing and clearing of the veins, which appear to be considerably enlarged. As they clear the later leaves pucker and finally tend to be coarse and crinkled and to stand more erect than those of healthy plants. Hearting is delayed and the hearts are smaller than normal.

The disease is spread through the soil to clean areas by transfer of seedlings and on boots and implements. The only practicable control in commercial gardens is rotation of crops, though the disease may last a long time in the soil.

Experimentally the incidence of the disease has been reduced by watering the soil seven days after lettuce has been planted with fungicides such as captan, dichlone, copper oxychloride, and thiram.

Infection may be eliminated from seedling bed soil by steam disinfection. Plants raised in soil free from the disease and not exposed to the disease until set out in the field do not take big vein as early as plants raised in infected soil. They are likely to produce marketable heads before hearting has started in plants raised in infected soil.

Lettuce Mosaic

Lettuce from seed infected with mosaic develop clearly defined light green areas on the first true leaves. When aphids transmit the disease the first symptom is clearing of the veins of young leaves, often with leaf puckering and marked serration of leaf edges. These symptoms are usually replaced later by a blotchy mosaic pattern. Small, brown, discoloured spots or areas may occur and leaf edges may become scorched. Infected plants are dwarfed and frequently fail to heart, the leaves forming loose rosettes. On plants going to seed, mosaic symptoms become pronounced on leaves of flower stalks.

The disease occurs naturally on lettuce and groundsel, but garden peas, sweet peas, prickly sow thistle, endive, marigold, and cineraria are possible sources of infection.

Control measures include the use of mosaic-indexed seed, isolation of lettuce plantings from existing lettuce crops, destruction of aphids, destruction of seedlings with typical light green or yellowish mottle, regular early inspections of the crop and destruction of infected plants, destruction of weeds (even in headlands and hedges), and ploughing in of crop refuse.

Sclerotinia Rot

The sclerotinia fungus usually attacks stem or leaves near ground level, causing a soft, water-soaked area that gradually spreads downward and upward. Plants wilt and collapse. In moist conditions the disease quickly produces white, cottony growth and irregularly shaped black bodies (sclerotia) ⅛ in. to ⅜ in. long.

In conditions which favour it the disease attacks many vegetables and is carried over from season to season by the sclerotia, which can remain alive in the soil for at least two years and germinate when conditions are favourable. Sclerotia near the surface then produce large numbers of spores, which are spread by air currents and in very humid and wet conditions infect crops of lettuce.

Good cultural practices are the only means of control. Plants should be spaced to expose them to sunshine and improve circulation of air, thus lowering humidity. Soil should be well cultivated and weeds removed. Diseased plants should be removed and destroyed by deep burial or burning. Where the disease is prevalent the seedbed should be disinfected with a fungicide such as formalin.

Botrytis Rot

The fungus *Botrytis cinerea* Pers. causes a rot on lettuces (and many other plants) known as botrytis rot, grey mould, or red leg. Infected lettuce seedlings collapse with a water-soaked rot and usually masses of grey spores develop on the dead tissue. When infection of the leaves stops at the base of the leaf stalks a small reddish scar may be left. This may become larger as the plant grows and later cause the head to become yellowish and collapse. The collapse is often accompanied by bacterial soft rot. Botrytis spores are not commonly produced on the rotting heads, but black resting bodies or sclerotia may be produced in large numbers.

The fungus is rarely carried over in the soil, except perhaps in the resting or sclerotial stage. Most infection comes from airborne spores from neighbouring crops or from infected weeds or dead plants.

Plants should be well spaced in seedbeds and should not be planted

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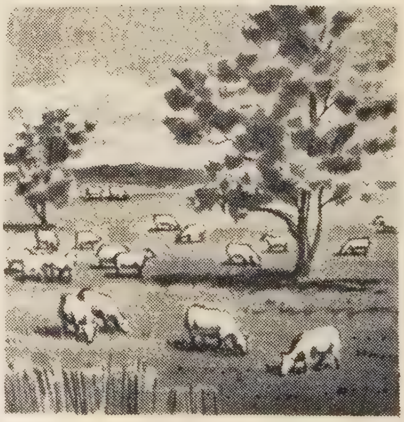

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near old or infected crops. Infected material should be destroyed as soon as seen. Seedbeds should be sprayed with thiram, zineb, or captan as soon as plants are established and the spray repeated at intervals of 10 to 14 days until just before planting. It is difficult to get satisfactory spray coverage on established plants in the field. Control of the disease in the seedbed is most important, as most losses in set-out plants result from seedbed infection.

Damping off

Rotting of seed before or after germination or damping off (rotting of the roots or collars) of the seedlings after emergence may be caused by one or several fungi which are present in many unsterilised soils. Older seedlings usually have some resistance to the organisms and may recover, but subsequent growth is likely to be impaired.

Soil and seed boxes should be sterilised with steam, chloropicrin, formalin, or other suitable material and seed should be dusted before sowing with captan, ferbam, or thiram. Soil should be well drained and aerated and seedlings not sown too thickly.

Aphids

Several species of aphids or greenfly transmit lettuce diseases and, where infestation is heavy, distort growth and make lettuces unfit for market. They can be readily controlled by insecticides such as lindane or malathion or HETP or in the early stage of lettuce growth by a systemic insecticide such as metasystox.

Slugs and Snails

Slugs and snails can be controlled by metaldehyde baits or, when the plants are small enough to be effectively sprayed, by spraying with HETP in late evening when the slugs or snails are out.

Weevils and Cutworms or Caterpillars

Weevils, cutworms, and caterpillars can be controlled by spraying with DDT.

Nematodes

Most species of nematodes (eelworms) are too small to be readily seen by the unaided eye. They enter the plant, usually the root, and damage the cells and feed on the sap causing wilting stunting, and death. They can be controlled under glass or in a seedbed by disinfecting the soil before sowing. Such control is not usually economic in the field and infested land is best used for crops which are immune from attack until eelworms die out for lack of a host or are so greatly reduced that lettuce crops are profitable.

Tipburn

Tipburn is the breakdown of the tissues of the actively growing leaves at their margins. It is commonest in very hot periods and on succulent, rapidly growing plants. Plants grown with a uniform, fairly high moisture supply are less likely to be affected than those that have a fluctuating supply, which causes irregular growth rate.

Tipburn rarely extends beyond about ½ in. from the margins of the leaves and the greatest loss usually results from secondary rots. Control is usually beyond the power of the grower and resistant varieties should be grown in areas prone to the disease.

Acknowledgment

Acknowledgment is made to Department of Scientific and Industrial Research Bulletin No. 14, "Diseases and Pests of Lettuces in New Zealand and their Control", for the section on diseases.

▼ Lettuces are harvested and packed directly in the field, usually as shown in banana cases.

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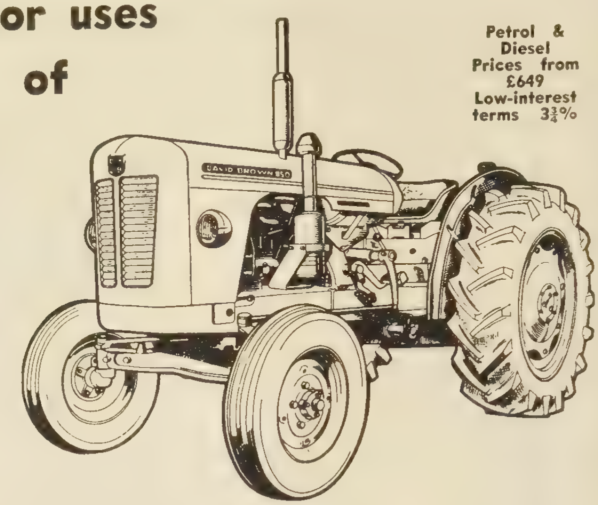

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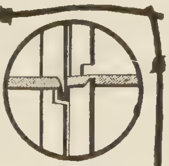

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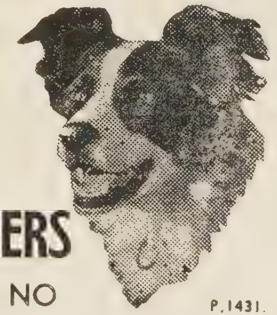

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October Work in the Home Garden

By A. G. KENNELLY

SOWING and planting hardy vegetables whether for successional use or main crop is the most important job in most home gardens in October. Most tender vegetables can be sown or planted where frost danger has passed. The date may be very early October in some northern districts until early November in places such as the plains area round Christchurch.

BEANS are one of the most important vegetables and many kinds and varieties are available. All varieties except broad beans are frost tender and require comparatively warm conditions for germination and growth. In districts not subject to late frosts an early sowing of either dwarf or climbing beans can be made from early October, according to the district, though in most districts the end of October or early November is preferred.

Successional sowings can be made as needed until about the end of January in most districts. Whether runner, climbing, or dwarf beans are grown usually depends on the space available. Climbing beans, if well grown, yield more heavily and over a longer period than dwarf, and the stringless climbing varieties are not inferior in flavour and quality to the best dwarf varieties.

Soil Preparation

The soil should be well drained and cultivated before sowing, and though it need not be more than moderately rich in organic material and nitrogen and potash, the addition of phosphates or complete fertilisers rich in phosphates has been found beneficial on many soils where trials have been carried out. Beans are tolerant of moderately acid conditions, but lime should be applied at 2 to 3 oz a square yard some time before sowing if the land has not been dressed with lime recently.

Climbing beans can be grown in rows without staking by slashing or pinching back excessively long growth, but where growing conditions are favourable best results are obtained if vines are staked or allowed to climb a support. With dwarf and climbing beans more than one sowing will be needed to ensure continuity of supply. Runner beans crop over a longer period than climbing or dwarf types.

Dwarf beans have the advantage of developing pods earlier, taking about seven to nine weeks, compared with about nine to 10 weeks for most climbing varieties.

Sowing

Bean seed should be sown 1 to 2 in. deep, but in exposed positions or on soils that tend to dry out a drill 2 to 3 in. deep should first be drawn out and the seed pressed 1 to 2 in. deep (according to whether the soil is heavy or light) in the bottom of it. Dwarf beans can be sown in single rows or double rows 6 in. apart with 2 ft between the rows. Seed should be sown or seedlings thinned to 2 to 4 in. apart; the richer the soil is the greater should be the distance between plants.

Runner or climbing beans are usually sown or thinned to 6 to 8 in. apart in double rows about 9 in. apart and 3 to 4 ft from other vegetables.

Butter or waxpod beans are stringless varieties of french beans with pale or golden pods. There are tall and dwarf varieties. Butter beans should be planted a little later than ordinary french beans. Good varieties include Pencil Podded Wax and Round Pod Kidney Wax (round-podded varieties) and Woods Centenary (butter) and Sure-crop Black Wax (flat podded).

SOW NOW

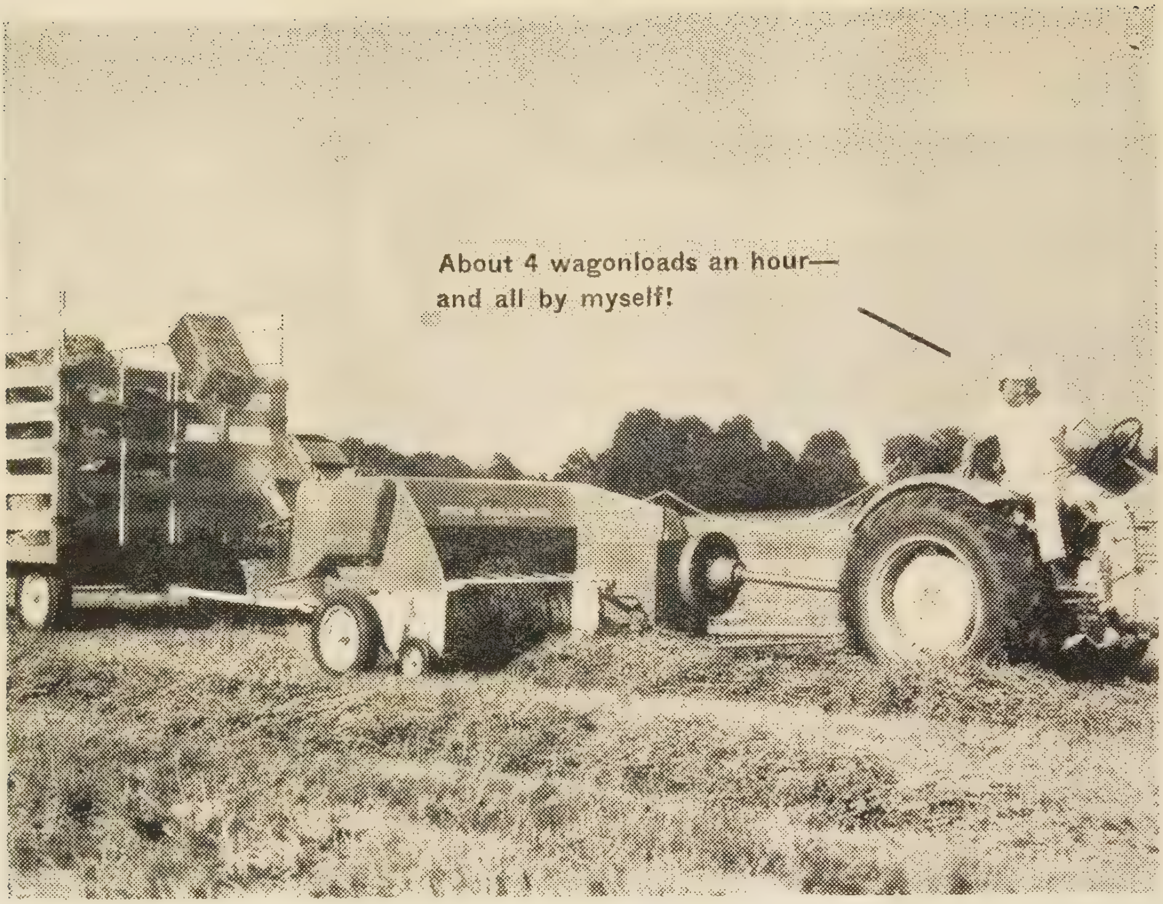
Beans (dwarf and climbing) Cucumbers Marrows Melons Pumpkins Sweet corn	When danger of frost is past or if protection can be provided
Lettuces Peas Radishes Turnips	Successional sowings
Cabbages Cauliflowers or broccoli	For harvesting in autumn and winter
Kale Beetroot Brussels sprouts Carrots Spinach or spinach beet	If not sown last month

PLANT OUT

Lettuces
Onions (southern districts)
Potatoes (main crop)
Tomatoes (late in month in most districts)

Silver beet Cabbages (summer) Cauliflowers	If not planted last month

Early potatoes should be hoed frequently to promote growth, the soil being drawn up to form a ridge as they grow. Plants should be protected from frost damage by covering them at night. Straw or hay is very suitable for this.



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Onions

In most South Island districts main-crop onions are usually sown in September. If this has not been done, a sowing should be made without delay as advised in last month's "Journal". Established crops should be kept cultivated and weed free.

Potatoes

One of the most important points in growing potatoes is the use of Government-certified seed. Few vegetables are subject to as many diseases as the potato and many of the diseases do not show in the tubers. Tubers infected with virus diseases such as leaf roll, mosaic, and crinkle may appear healthy and of a desirable type, yet if it were not for the seed certification scheme, these diseases would reduce the total yield of potatoes in New Zealand by half or perhaps two-thirds.

Virus diseases are transmitted mainly by aphids (greenfly), the lower incidence of which in the cooler parts of the South Island is the main reason for growing most of the certified seed there.

Apart from certified seed the important points in potato growing are choice of variety, soil condition, and cultivation. Though the home gardener can usually make his soil more productive by drainage, rotation of crops, addition of humus or humus-forming materials, and judicious application of fertilisers, he cannot change his soil type or the aspect of his garden. He should, therefore, select varieties most suited to his condition.

Soil and Lime

The soil for potatoes should preferably be deeply and thoroughly cultivated, as thorough preparation of the soil not only ensures a good seedbed, but helps to maintain it in a satisfactory state of moisture, aeration, and temperature. Soils that have been trenched should, however, be given time to settle before planting begins.

Because they may induce a condition which favours scab, heavy dressings of organic manure are not advisable just before planting. A heavy dressing applied the previous year so that it is thoroughly decomposed or a green crop dug in some time before planting will, however, usually give satisfactory results, as also will the addition of material such as grass clippings.

Soils which have recently been heavily limed should not be used. The potato is tolerant of acid conditions, and in soils infected with potato scab the growth of the organism will be suppressed if the soil is medium to strongly acid. Apart from soil acidity the development of potato scab is influenced by both soil temperature and moisture. Its development is usually favoured by soil slightly drier than desirable.

Fertiliser

The fertiliser needed for potatoes depends largely on the amount of organic material previously incorporated in the soil, but generally it has been found in Department of Agriculture trials that on the lighter and medium soils in fairly good condition a mixture of 3 parts of superphosphate and 1 of sulphate of ammonia applied at about 1½ oz a yard of row is satisfactory. On rich alluvial soils the dressing should be 5 parts of superphosphate to 1 part of sulphate of ammonia applied at about 1½ to 2 oz a yard of row.

On many home garden soils sulphate of potash will give improved results if added in the proportion of 1 part to either of the mixtures given. As an alternative to superphosphate and sulphate of ammonia equal parts of superphosphate and blood and bone can be used.

Planting

The simplest way to plant is usually to open trenches about 4 in. deep and 2 ft apart and to dust the fertiliser along them. Tubers can be set 10 to 16 in. apart in these rows. Early crops which are to be lifted as new potatoes can usually be planted closer.

If the seed tubers are large (4 oz or more), they can be cut into two or more sets. Each should have at least two eyes and a minimum of cut surface.

Cut tubers should be planted immediately. The soil should not be too wet or too dry. If the cut surface is permitted to dry out before the protective skin is formed, the plants are likely to be poor. Dusting the cut surface with ashes, sulphur, or lime to dry it is not necessary, though sulphur may have some value because of its fungicidal action.

Potato tubers do not need to be sprouted, but sprouting gives earlier growth and with early varieties, earlier lifting. With main-crop varieties, too, the crop gets a better start and in most seasons matures earlier. Short, sturdy shoots should be aimed at, as long, weak shoots are easily knocked off or damaged in planting.

All photographs by Sparrow.

A. and P. Show Dates

THE following are dates and venues of A. and P. shows up to the end of December 1961:

NORTH ISLAND

October

13, 14 October—Poverty Bay A. and P. at Gisborne.

17, 18, and 19 October Hawke's Bay A. and P. at Hastings.

26, 27, and 28 October—Waikato A. and P. at Hamilton.

27, 28 October—Wairarapa and East Coast A. and P. at Carterton.

November

1 November—Cambridge A. and P. at Cambridge.

*3 and 4 November—Manawatu and West Coast A. and P. at Palmerston North.

4 November—Tokoroa A. and P. at Tokoroa.

8 November—Hauraki A. and P. at Paeroa.

10 and 11 November—Whangarei A. and P. at Whangarei.

*10 and 11 November—Wanganui A. and P. at Wanganui.

11 November—Central Hawke's Bay A. and P. at Waipukurau.

11 November—Rotorua A. and P. at Rotorua.

11 November—Clevedon A. and P. at Clevedon.

15 November—Thames Valley A., P., and H. at Te Aroha.

*17 and 18 November—Egmont A. and P. at Hawera.

18 November—Waihi A. and P. at Waihi.

18 November—Bay of Islands P. and I. at Waimate North.

*23, 24, and 25 November—Auckland A. and P. at Epsom, Auckland (Royal Show).

24 and 25 November—Stratford A. and P. at Stratford.

29 November—Plains A. and P. at Ngatea.

December

1 and 2 December—Taranaki A. and P. at New Plymouth.

1 and 2 December—Kaikohe A., P., and H. at Kaikohe.

*2 December—Helensville A. and P. at Helensville.

SOUTH ISLAND

October

*14 October—Ellesmere A. and P. at Leeston.

21 October—Northern A. and P. at Rangiora.

28 October—Amberley A. and P. at Amberley.

28 October—Motueka A. and P. at Motueka.

*28 October—Ashburton A. and P. at Ashburton.

November

*3 and 4 November Marlborough A. and P. at Blenheim.

*8, 9, and 10 November—Canterbury A. and P. at Christchurch.

11 November—Tokomairiro A. and P. at Milton.

15 November—North Otago A. and P. at Oamaru.

*17 and 18 November—Nelson A. and P. at Nelson.

18 November—Waimate A. and P. at Waimate.

18 November—West Otago A. and P. at Kelso.

18 November—Courtenay A. and P. at Kirwee.

18 November—Taieri A. and P. at Outram.

22 November—Winton A. and P. at Winton.

24 and 25 November—Timaru A. and P. at Timaru.

*25 November—South Otago A. and P. at Balclutha.

28 and 29 November—Gore A. and P. at Gore.

December

2 December—Wyndham A. and P. at Wyndham.

2 December—Otago Peninsula A. and P. at Portobello.

*5 and 6 December—Southland A. and P. at Invercargill.

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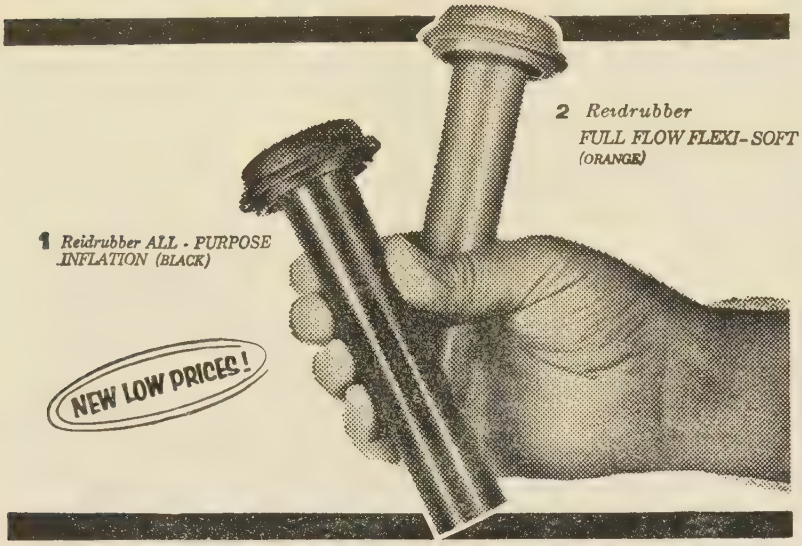
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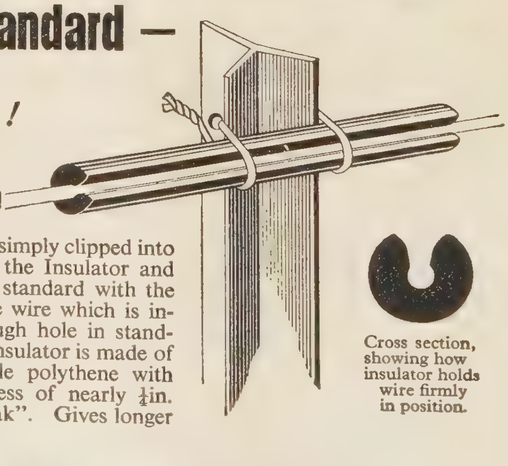

Cross section, showing how insulator holds wire firmly in position.

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Tussock Grassland Improvement by Grazing Management

CONTROL of rabbits, better subdivision, oversowing and topdressing, and increasing use of cattle have played important parts in improving the plant cover on and thereby raising production from low- to mid-altitude tussock country. The success of these methods, individually and in combination, has diverted attention from the one tool for improvement which affects all methods, all areas, and all vegetative conditions—the grazing animal and its management.

By J. M. HERCUS,
Farm Advisory Officer
(Agrostology),
Christchurch

WITH the welfare of the animals of prime consideration, present management practices have been evolved over a long period, and there is a natural reluctance to depart from tried and proved experience.

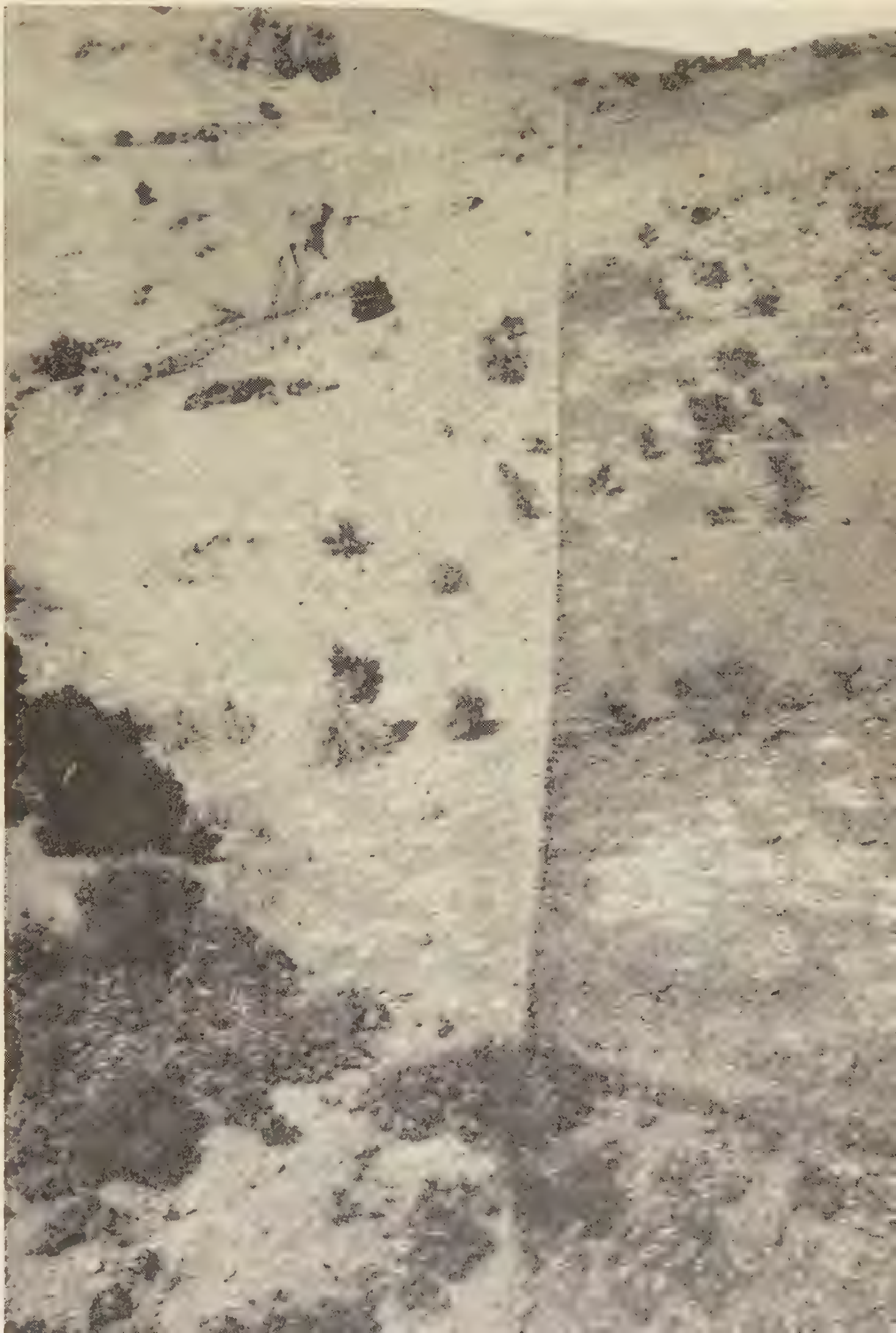
However, there is a growing body of evidence to suggest that, with a knowledge of which are the desirable pasture species and of their requirements for good growth and seeding, relatively minor adjustments in the present management can not only accelerate improvement, but can also direct it along the most productive lines.

A considerable amount of work is required before this approach can be properly developed, evaluated, and exploited throughout the whole range of tussock grassland. The observations described in this article refer to the depleted country, and there is good reason to expect this manipulation of grazing management to give similar, if less spectacular, results elsewhere.

Hill country sheep if allowed any choice concentrate their grazing on sunny aspects from soon after the onset of winter frosts until high summer temperatures, drought, and close, continuous defoliation prevent further plant growth on these sites. The animals may follow the spring and summer growth up these warm faces, but not until the palatable species "throw in the sponge" will they shift to shady country.

It does not seem to matter what quality or quantity of feed is available over the ridge, this is the broad pattern of behaviour, and we must take it into account in our efforts to improve the plant density and productivity of tussock country.

Throughout a large part of the low-rainfall tussock grassland, the present



Boundary fence on steep sunny → face, with experimental area on Mr Kane's property on the right. There is grazing by sheep on both sides of the fence, but on the right there is recovery and spread of resident vegetation because of a small difference in time of utilisation.

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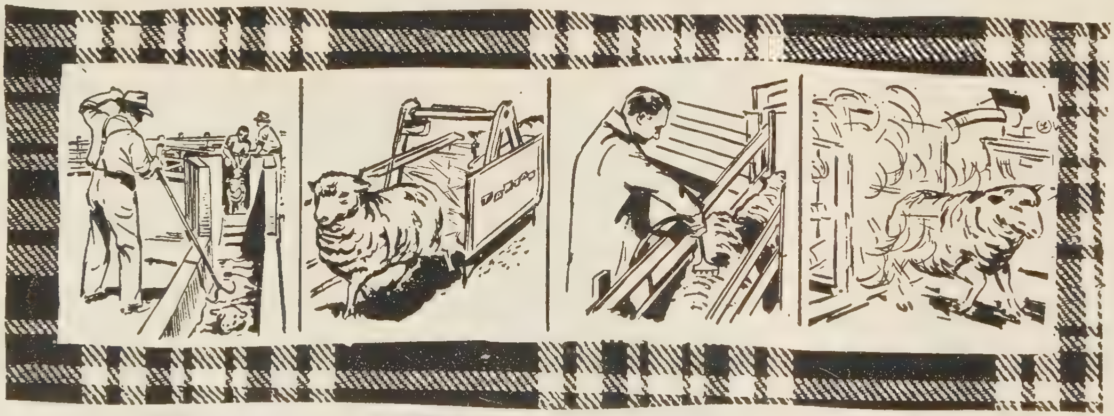

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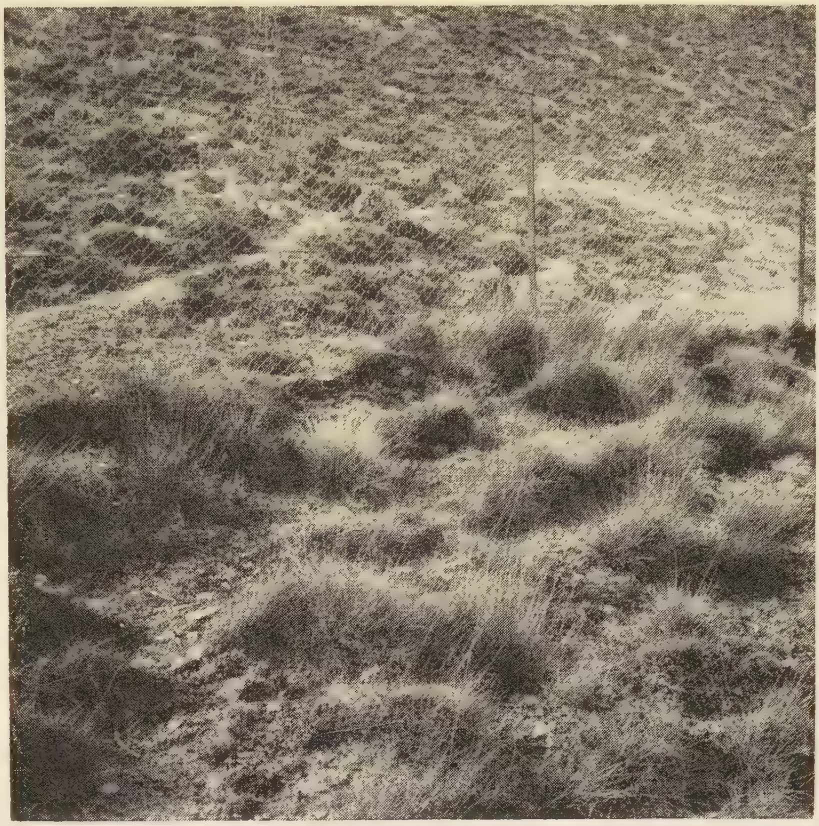

Top boundary of experimental area on Mr Kane's property. This difference is due to time of grazing in the spring and early summer. The trial block, in the foreground, yields similar sheep grazing days to neighbouring area, but management is allowing recovery and spread of valuable resident species.

plant cover on sunny aspects is sparse and unthrifty, particularly below the normal winter snow level. This condition is due partly to the exposure, or hostility, of the sites and partly to the effects of a century of occupation.

We cannot do much about the climate or the exposure, but we can and must look closely at our management: firstly to encourage as rapid a recovery as the environment will allow, and secondly to try to direct this recovery along desirable lines.

Grazing Management

Grazing management varies from property to property and from district to district, but in general sheep remain on the winter blocks until well into spring. Dry sheep may be put on to higher country in October-November, but ewes and lambs and replacement stock are frequently kept on until December or even later.

What is the effect on the vegetation?

Preferred species on these depleted warm faces are heavily grazed during the period of most active growth. They are given no opportunity to build up root reserves; in fact, this treatment will actually tend to weaken their root system.

This effect is serious enough on its own, but another important result is that seeding of these desirable plants is heavily reduced, if not actually prevented. This management weakens the very plants we should try to encourage, restricts their chances to spread and multiply, and leaves the area wide open to colonisation by unpalatable species.

As this is happening on the depleted faces we have the spectacle of feed going to waste—getting past the desirable stage of growth for sheep—on the better clad shady aspects alongside.

Possible Solutions

The easiest solution would be to change the sheep's grazing habits, but until someone has some hopeful ideas in this direction we will have to find other answers. What are some of the possibilities?

1 **Fence off sunny country from shady.** Mostly this would be impracticable and the best that can be done is to subdivide into dominantly sunny as against dominantly shady, and manipulate the grazing times and intensities between them.

2 **Use more cattle.** The idea would be for the cattle to control the growth on the shady country and so entice the sheep off the problem aspects before hunger forces them off. This approach has helped, but has not solved the problem.

3 **Oversow and topdress.** In the low-rainfall areas we are discussing, responses to this treatment have usually been much better on dark than on sunny faces, and it might be that this would serve to entice the sheep round the hill if not during winter itself at least in mid-spring months. Present evidence doesn't hold high hope for this approach; where blocks contain pronounced aspect differences, the sheep still concentrate too long where we don't want them, and by the time they have eaten out the sunny faces, the rest of the area is more like a hay crop than a pasture. However, oversowing, topdressing, and increased cattle numbers have a definite beneficial effect. (It should be emphasised that this is not to say topdressing is not worth while; what is meant is that it is unable, on its own or with cattle, to solve the problem of shifting the sheep grazing pressure at the critical time.)

4 **Vary stock numbers.** We could stock one winter block heavily this year and lightly next year, say from October until the sheep are taken off in summer. This sounds reasonable, but is not completely satisfactory. It isn't **numbers** of animals as much as **time of grazing** that is important. True 10 animals will eat much less than 100, but 10 can be much more selective in their diet, and the most desirable species are still overgrazed.

5 The methods given can all help to some degree, but if it is out of the question to fence off sunny from shady country, we must look to **complete spelling at critical stages of growth** to achieve our objective. When are these critical stages of growth and where are the sheep to go at these times?

Observations from Experiments

Two observations from the depleted country of Central Otago are pertinent. In an article in the July issue of "The Journal" on what sheep eat on this country an experimental area on Mr D. Kane's property near Hawea Flat was mentioned. The general aspect and condition of this block were described, and the responses to oversowing treatments summarised.

These oversowings were made in 1949, and since 1953 the block has been grazed each winter. Until 1956 the sheep were put on in May-June, but since then they have gone on in autumn in an endeavour to obtain some grazing from the well clad shady

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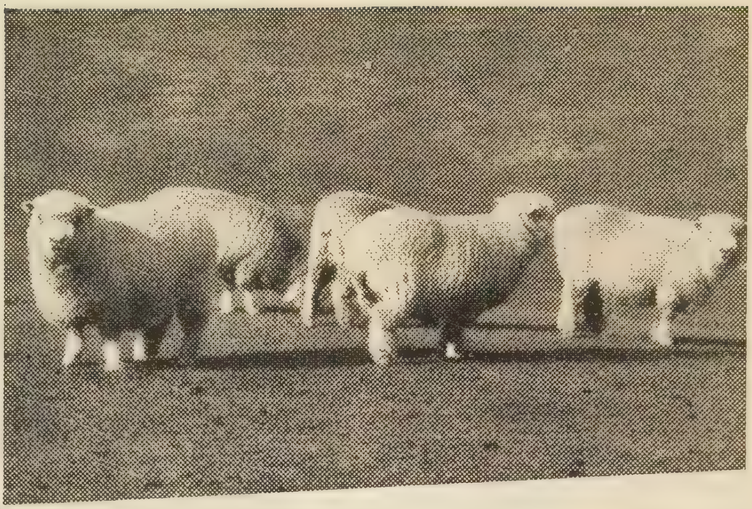

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aspects before the frosts start. The animals have come off every year in September. Grazing intensity has been at or better than one hogget per acre for this five to six months each year since 1956.

Over the years, most interesting fenceline differences have developed between the experimental area and the surrounding run country. The striking feature of these differences is that on the sunny aspects—where they are most pronounced—they are due **not** to oversowing but to grazing management.

By taking the sheep off in September we have allowed the valuable resident perennial species to make good growth, to set seed, and so to spread and thicken up. Oversown species have played a very minor role in the improvement of these sites. Outside the fence, where the sheep remain until much later in the season, these same resident species are present, but they are sparse, never showing much fresh leafage, and rarely producing any seed.

In terms of sheep grazing days per year the experimental area is probably yielding as much as the surrounding hill country, but on the experimental area the perennial plant cover is improving quite markedly while outside it any improvement is imperceptible.

The second observation concerns a small oversowing trial on depleted hill country at Roxburgh East. Grasses and legumes were sown in spring and autumn on disturbed and undisturbed ground.

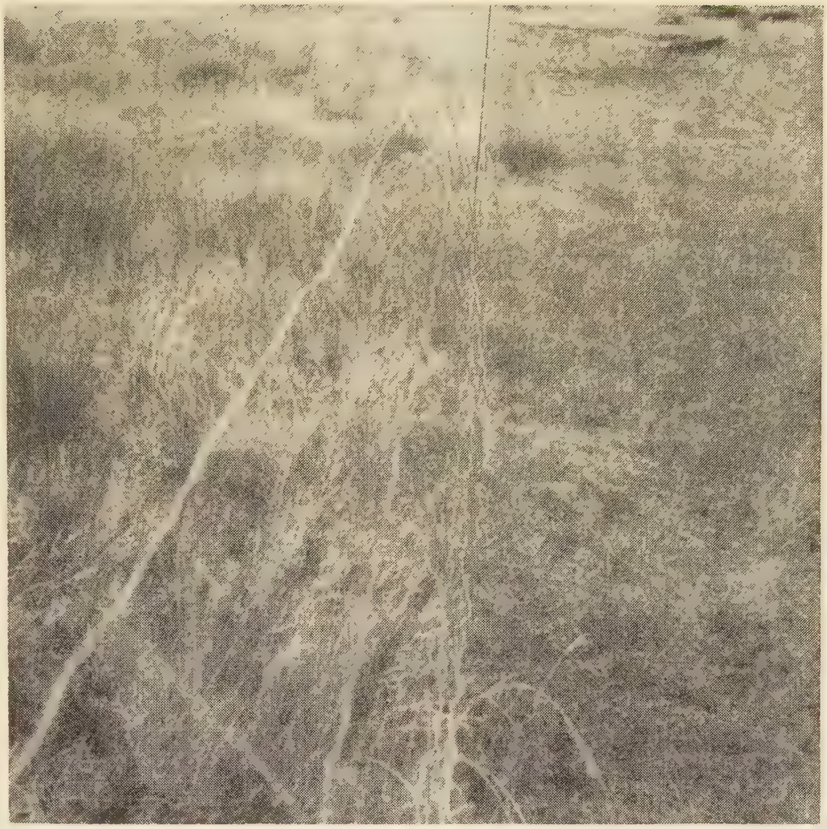
The trial plot was fenced off in late November, and the sheep continued to graze the surrounding area for a further month. By April there was a spectacular difference between the areas inside and outside the fence. It was **not** due to oversowing, but took the form of good growth and seeding of resident perennial grasses.

By removing the grazing pressure four to five weeks earlier than usual, recovery of the vegetation was encouraged, and the species which responded were the ones preferred by the sheep over the winter.

Other examples of this effect could be given, but these two should be sufficient to indicate when is the critical season and what can happen by making use of this information.

A considerable amount of work will have to be done before we can fully describe this critical period. and it will certainly vary with the plants we want to encourage, the season, the altitude, and so on.

However, I suggest that for those areas of depleted winter country up to about 2,500 ft where there is a nucleus population of desirable perennial species, a considerable improvement to cover and yield can be obtained by simply removing the sheep by early to mid November.



Fenceline difference on trial area at Roxburgh (photograph taken in late autumn). Sheep were taken off the area on the left three weeks earlier than from the surrounding area, allowing resident perennial grasses to grow and seed.

This does not require any drastic change in flock management; it is simply a matter of moving the animals from some or all of their winter blocks about four to six weeks earlier than is usual at present. This adjustment would be made during a period of active plant growth, and it need not involve any check to ewes and lambs or to replacement stock.

The appropriate solution will depend on the particular property, the amount of cultivable land, the type and intensity of subdivision, and so on. Improved pasture on the valley floor, topdressed and oversown downs and terraces, or hill blocks of largely or entirely shady aspect, less suitable for actual wintering, are some of the alternatives.

Another approach involves concentrating the sheep on one or more of the winter blocks for this six-week period and spelling the others. Next year this management is reversed and the spelled areas are hard grazed in November-December. If the size and number of blocks permit, it would speed up the recovery if this heavy grazing in early summer took place one year in three rather than in alternate seasons.

There is an understandable reluctance to alter an established system of run management until it has been clearly demonstrated just what can be achieved, by so doing and at what cost.

There is no run-scale example yet of the improvement possible on depleted winter country by the system of spelling outlined, but evidence is growing from trials and from runholders' experiences to show that it holds the key to rapid, worth-while, and permanent recovery on all but the most barren and exposed sunny aspects.

Measures such as topdressing and oversowing, increased subdivision, and increased use of cattle can play a valuable part in assisting this recovery and increasing production, but they must be augmented by grazing management where density, vigour, and composition of the vegetation are concerned. The guiding principle in utilisation is to avoid grazing the same block at the same time in the growing season every year, and the most critical time is in late spring and early summer.

FOR USE AFTER ASSISTED LAMBING TO PREVENT BLOOD-POISONING AND BLACKLEG IN SHEEP.

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'100' (Lambs) Arthritis, etc.

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'1500' (Cattle & Pigs) Footrot, etc.

In flat tins with hypodermic needle

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THE GREAT EWE SAVER AT LAMBING TIME —
PROCAL
(pronounced Pro-kal)

Blackleg in sheep, more commonly referred to as blood poisoning, usually results from infection of wounds, such as occur at shearing, dipping, lamb marking, docking or in ewes while lambing. This is understandable when it is realised that the blackleg germs are frequently found in the wool and on the skin of normal sheep and in the soil and pastures.

Prevent Ewe Losses at Lambing Time

Blackleg losses in ewes associated with lambing are prevalent during the lambing season, and ewes assisted at lambing almost invariably die unless an intramuscular injection of Procal (pronounced Pro-kal) Hypodermic Penicillin 500 is given immediately after each operation. A further injection after 24 hours—as a preventive measure—should follow. At lambing most cases are due to infection from shepherds' hands; an immediate injection of Procal will kill the bacteria before it can attack.

Navel Ill or Arthritis in Lambs

Navel Ill or Arthritis is a bacterial infection causing an inflammation of a joint and sometimes death. These bacteria enter the body either through the undried navel cord soon after birth or through wounds, such as occur at castration, docking and ear-marking. They then reach the joints via the bloodstream. Affected lambs are lame on one or more legs, or may show a general stiffness, a few days to a week or more after marking, and death may occur quite quickly.

Treatment and Prevention with Procal

Navel Ill and Arthritis frequently causes death unless treated with Procal. A preventive injection of Procal immediately after each operation will attack the bacteria in the bloodstream. For small lambs, inject one tube of Procal 100; and repeat as necessary. In acute cases, a tube of the stronger strength—Procal 500—is advisable.

Footrot in Cattle, Dairy Cows and Pigs

Many cases of footrot respond dramatically to Procal Penicillin. An injection of one or two tubes of '1500' strength with a repeat in 24 hours is recommended.

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Johne's Disease of Sheep in South Canterbury

JOHNE'S disease is a major cause of economic loss in cattle in the intensive dairying districts of the world, and also occurs in sheep in several countries, causing considerable economic loss. In South Canterbury the disease is an old one and is widespread, but of low incidence, along the coastal crossbred sheep breeding country. It should be suspected in any flock where there is an annual mortality from an incurable wasting disease in adult sheep. Resistance to the disease can be enhanced by good sheep husbandry, including good rearing of ewe lambs, adequate nutrition for breeding ewes, and the control of debilitating diseases such as severe footrot, foot abscesses, and parasitism. The use of a killed non-infective vaccine in lambs should give satisfactory protection under New Zealand conditions where it may be justified.

By M. C. ARMSTRONG,
Veterinarian,
Department of Agriculture,
Timaru

JOHNE'S disease is a slowly fatal bacterial infection of the intestines of cattle, sheep, and goats, in which the Johne's bacilli multiply in the wall of the intestine, causing a chronic inflammation and thickening of the part concerned with the absorption of digested nutrients.

Cattle Disease

Being insidious the disease does not give rise to sudden spectacular deaths in cattle, but the accumulated losses year by year are greater than from most other infections and it appears to be causing increasing economic loss in many cattle districts of the world. It occurs frequently in the major dairying districts of the North Island, especially in Taranaki and Auckland Provinces. In South Canterbury cattle raising is not intensive and the incidence of Johne's disease is occasional and limited in both dairy and beef cattle.

In Sheep

Johne's disease of sheep occurs in Europe, Great Britain, U.S.A., Canada, Iceland, India, and New Zealand. In some of these countries it is of considerable economic importance, especially in Iceland. A widespread gradual increase of Johne's disease seriously challenged the sheep industry of Iceland several years after the introduction of the disease by imported sheep from Germany in 1933.

Mixed-age ewes infected with Johne's disease.

In New Zealand Johne's disease of sheep was first diagnosed in the Hunter district of South Canterbury in 1952. Since then it has been diagnosed in 30 more sheep flocks along the foothills and in coastal areas of South Canterbury (see map on page 265). It appears to be of widespread occurrence, but fortunately of low incidence in South Canterbury. The incidence varies from ½ to 4 per cent of total breeding ewes.

The South Canterbury farms involved are in mixed arable country varying from light plains with well drained stony subsoils to heavy clay downlands and foothills. Special winter feeding of sheep is necessary for about four months in this region. In addition to a basal ration of hay there may be special crops of chou moellier, swedes, soft turnips, green cereals, and autumn-saved pasture.

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The average standard of winter feeding in this district is good.

Johne's disease of sheep does not seem to occur in other important sheep raising districts of New Zealand, except in Mid Canterbury, where some positive cases have been recognised.

Though the appearances and circumstances of Johne's disease of sheep can readily be mistaken for parasitic disease, it is advisable to check the possibility of Johne's disease occurring in any flock where there is an annual mortality from an incurable chronic wasting disease in breeding ewes.

Class of Sheep Affected

Most diseased sheep are three- or four-year-old breeding ewes and no cases in New Zealand are recorded in sheep under two years. Only breeding ewes subject to the stresses of lambing and lactation seem susceptible under New Zealand grassland conditions.

Symptoms

Suspicions are aroused when one or more breeding ewes approaching mature age progressively lose condition, usually without scouring or obvious reasons, while the flock in general is in good condition. There is great loss of condition accompanied by weakness and a hollow, emaciated appearance, while unaffected ewes are generally in excellent condition.

The body temperature varies little from normal. The wool becomes harsh, cotted, and pulls easily after clinical symptoms announce the presence of a severe check. Death invariably ensues within several weeks.

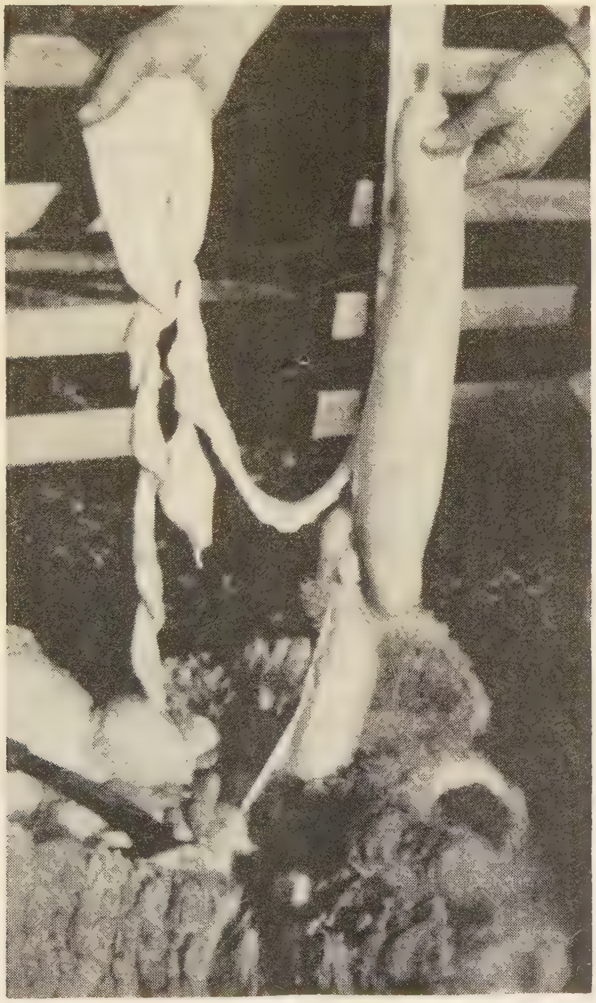
In cattle Johne's disease is characterised by the onset of a persistent debilitating scour which is usually precipitated after calving, but in sheep the symptom of diarrhoea is not constant and occurs in only a minor percentage.

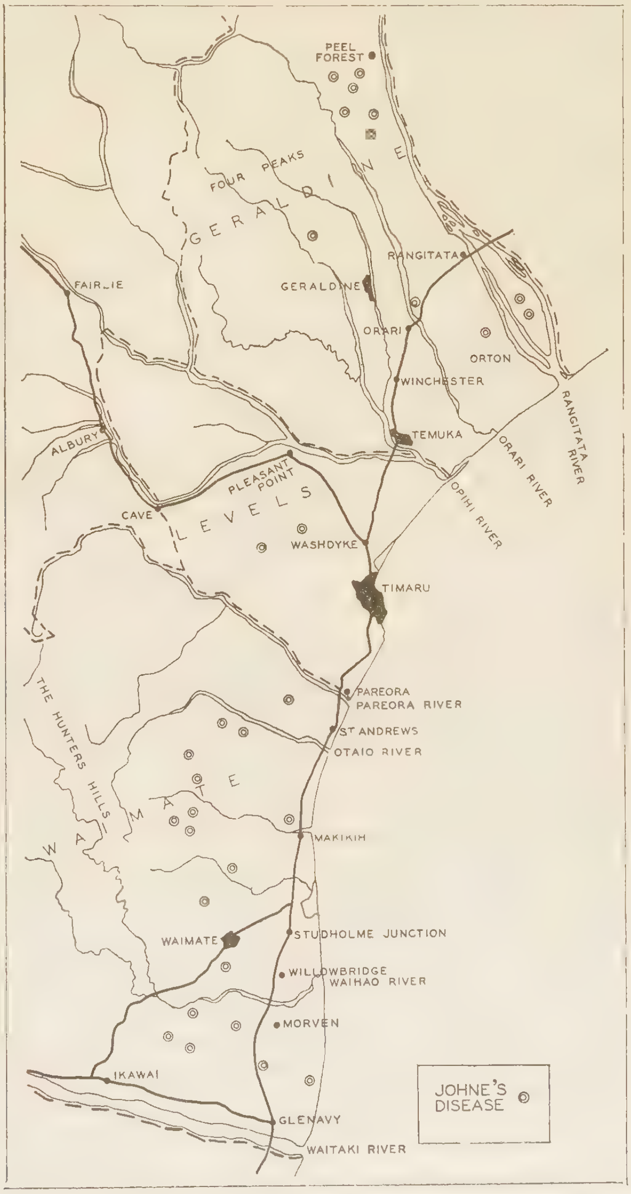
Post-mortem Appearances

The carcass varies from thin to extremely emaciated, depending on the inherent constitution of the animal, the degree of secondary worm infestation, and the adversity of feed and climate. Scouring and anaemia may vary with the intensity and nature of secondary parasitic complications. The majority of cases carry a moderate worm

Map of South Canterbury showing the distribution → of flocks of sheep in which Johne's disease has been confirmed.

↓ The right hand is holding the last few feet of small intestine, part of which is thickened by Johne's disease. An enlarged lymph gland is attached to the diseased part of the intestine. In the left hand is the caecum and the first part of the large intestine.

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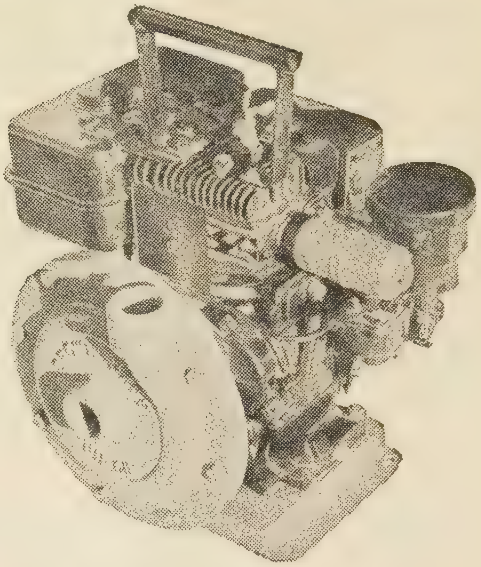

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burden; in some it is very heavy and in others negligible. Parasitic treatments are usually given early to eliminate the possibility of simple parasitic disease.

Visible lesions in the gut are confined to the last few feet of the small intestine and the first few feet of the large intestine. The most constant abnormality is a thickening of the last few feet of the small intestine. After the thickened part of the intestine is opened, the inner wall or mucosa is found to be wrinkled into corrugations instead of a thin smooth texture.

Microscopic examination of stained sections of the infected gut and stained smears of its internal surfaces reveals clumps of Johne's bacilli.

Diagnosis

The disease is confirmed by a combination of the history and appearances of the sheep, presence of Johne's bacilli in smears of intestine or dung, and a positive blood test. The blood test has been found to be of high efficiency and is especially useful as a first check on the live animal showing suspicious symptoms.

The Infective Agent

The disease is caused by Johne's bacteria of which there are selective strains producing the disease in sheep and cattle. Evidence from various countries does not indicate an easy passage of infection from sheep to cattle and vice versa, but indicates the existence of three selective strains causing natural disease in sheep and another causing natural disease in cattle.

In New Zealand no cases of Johne's disease of sheep have been recorded in the areas of the North Island where the disease in cattle has been prevalent for very many years. In the affected sheep district of South Canterbury there does not appear to be any significant passage of infection from sheep to cattle.

Predisposing Causes

The predisposing causes of Johne's disease of both sheep and cattle are not well known. Johne's bacilli excreted in the dung from diseased animals contaminate pastures, water, and foodstuffs. Factors of importance seem to be any conditions that may lower bodily resistance and activate a concealed infection.

With cattle there is evidence that the stresses of calving and lactation favour the development of visible disease and similar exciting causes may apply to sheep. A peak of incidence occurs within a few weeks after lambing and again a few weeks after weaning.

The average rainfall on affected sheep farms in South Canterbury varies from 20 to 40 in. and the disease is rather more prevalent in the wetter regions near the foothills.

It is difficult to produce experimental disease in animals fed adequately, but it is easy in undernourished animals. There is good reason to believe that the same is true under field conditions. Good nutrition and good management will not by themselves eliminate the disease, but an adequate diet, especially during the first year or so, and careful management will lessen the degree of infection and reduce the number of animals which develop visible disease.

In sheep a good standard of winter feeding for ewes and hoggets, control of foot rot, avoidance of overstocking, good drainage of heavy soils, establishment of palatable pastures, and prevention of ill thrift of lambs are factors to be considered.

Treatment

Johne's disease is still classified as incurable, and existing antibiotic or chemotherapeutic agents, which have proved so helpful in the treatment of tuberculosis in man, are ineffective.

Control by Vaccination

Two features of the Johne's bacillus are important in control of the disease. Firstly, it has a long period of development in infected animals. In both sheep and cattle the disease is acquired early in life, probably during the first year, and slowly progresses until visible symptoms become manifest sometime after two years of age. Secondly, the Johne's bacillus is a strict parasite which does not multiply outside the animal body, but is capable of a long period of survival in the external environment, probably as long as 10 months in dung.

A major problem with control of Johne's disease is that many animals in apparently good health can excrete the bacilli in the dung for many months before visible disease signs develop or infection can be detected by diagnostic tests. An important obstacle is the inability of diagnostic aids to identify and remove animals carrying concealed infection before symptoms appear.

For a number of years control measures in Iceland were based on early diagnosis, either skin tests or symptomatic appearances of the sheep being used and then all suspected cases being destroyed. This method failed to arrest the serious spread of the disease in that country and control by active immunisation was intensively investigated.

A living vaccine to protect cattle against Johne's disease has been widely used in France for many years and effective immunity is produced.

When the disease in sheep became serious in Iceland during 1947, preliminary trials of a new type non-infective killed vaccine gave promise of satisfactory and lasting immunity. One millilitre of vaccine containing 5.0 milligrams of killed dried bacteria suspended in sterile mineral oil was injected under the skin of lambs in autumn. In a large-scale vaccination trial during 1948-1956 about 450,000 sheep were given excellent protection by the killed vaccine. The average annual death rate was 11.9 per cent in unvaccinated groups compared with 0.6 per cent in vaccinated ones, giving an over-all reduction in mortality of 94 per cent.

In New Zealand, a non-infective killed vaccine similar to that used in Iceland was produced at the Wallaceville Animal Research Station in 1955 and a vaccination trial was started in a South Canterbury flock with the highest incidence of Johne's disease.

The vaccine was injected just under the skin at a site on the neck near the brisket. Within 10 days there formed a firm, painless lesion 1 to 2 in. wide and during the next three months small abscesses matured, discharged, and healed within the vaccine lesion, which caused the lambs no inconvenience. Furthermore they formed at a site that could be trimmed off at slaughter without affecting the grading of the carcass.

Vaccination Results

During the three years 1955-57, 1,000 ewe lambs were vaccinated and 500 similar lambs marked as controls. Assessments to the year ending 1960 record four positives in the controls and no disease in the vaccinated sheep. These vaccination results in New Zealand are therefore in line with the excellent pattern recorded in Iceland. Where the incidence of Johne's disease in sheep is considered high enough to justify vaccination, there is every chance that satisfactory protection will be obtained under New Zealand conditions.

Acknowledgments

The author is indebted to the Director and staff of Wallaceville Animal Research Station for technical assistance, diagnostic work, and vaccine preparation; also to the veterinarians of the Waimate Farmers' Veterinary Club and the South Canterbury Veterinary Club, Temuka, for assistance with farm investigations.

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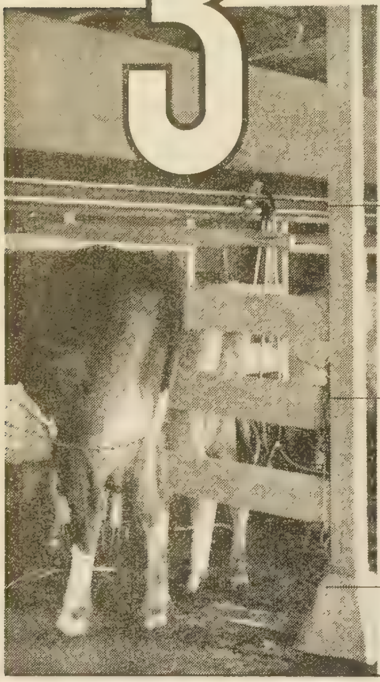

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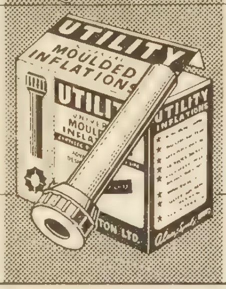
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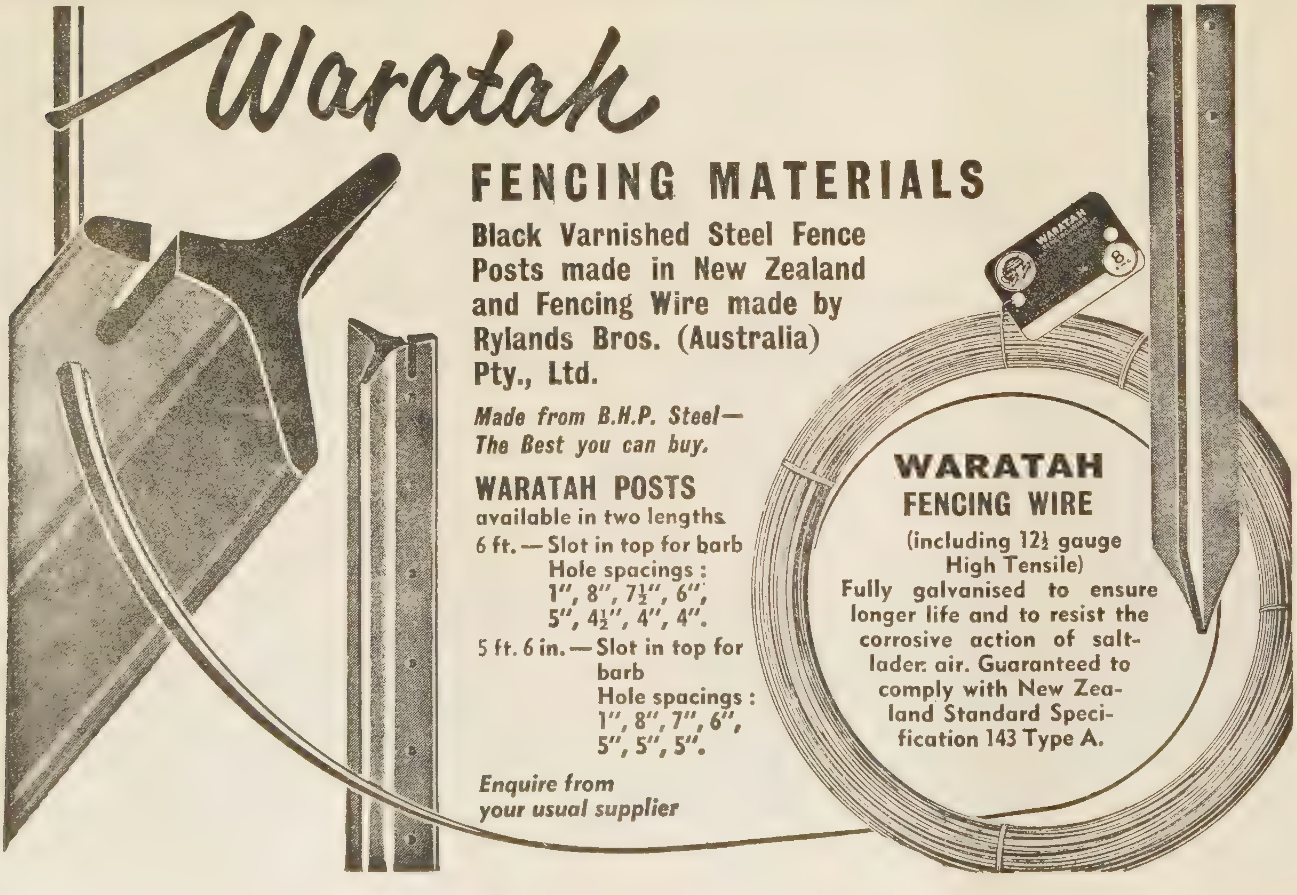

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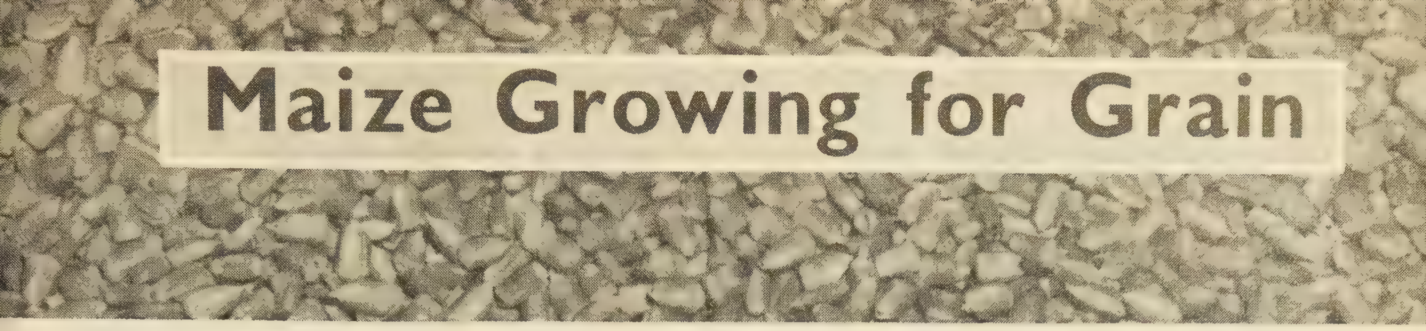
Maize Growing for Grain



By H. de O. CHAMBERLAIN,
Farm Advisory Officer, Department of Agriculture, Gisborne

HARVESTING and storage of maize, maize seed, and diseases and pests of the crop are discussed in the second and concluding part of this article on maize growing for grain. Soil and climatic requirements, seedbed preparation and manuring, sowing, varieties, and weed control were dealt with in last month's "Journal".

IN a normal season maize for grain is harvested between April and the end of June. Small areas in the Gisborne district and fairly large areas elsewhere are still harvested by hand.

Hand-picking gangs work on a contract which usually provides for the cobs to be picked, husked, and bagged, cartage to cribs being provided by the grower. For this method of harvesting it is better, where possible, to delay harvesting until frosts have occurred, because these tend to make the stems more brittle so that the cobs come away freely.

Machine picking is done by single-row or 2-row pickers which strip the cobs from the plants, remove the husk, and deliver the cobs free from extraneous matter to a tractor trailer or lorry moving alongside. Each mechanical picker is served by two and sometimes three lorries or tractor trailers to ensure that as soon as one is loaded an empty one takes its place.

The contract price for machine picking in 1959 was £6 per acre, the farmers being responsible for cartage to cribs.

Storage

Storage space must be provided for the harvested cobs. Maize freshly brought in from the field is not fully mature and still contains an excess of moisture, which must be dried out of the cobs before the grain can be safely shelled and stored in sacks. To give protection from rain and at the same time allow for free circulation of air through the cobs the maize is stored between harvest and shelling of the grain in specially designed buildings known as cribs.

The time the maize has to remain in the crib before it is ready for shelling varies with the weather. In windy, dry seasons it may be ready in six weeks to two months, but in wet, cold springs with little wind drying may take several months. Shelling of the maize once the cobs are dry may be continued as other work permits and to meet market requirements through spring and summer and even into autumn right up to the time the next crop is ready for harvest. Cribs must therefore be strong, weatherproof, and adequate for the crop.

The main requirements of a good crib are:

1. It should be made as weatherproof as possible by having a good overhang at the eaves and by being sheltered from the direction from which wet weather mainly comes.
2. It should be vermin proof and raised well off the ground.
3. It must provide ample aeration for the maize.
4. The roof must be easily removed to allow filling from the elevator down the whole length of the crib.

To gain all these advantages for a permanent crib the floor must be well supported with concrete piles or wooden ones shielded on top with tin and the walls should be of fine-mesh wire netting placed on the inside of a strong framework so that the inside width of the crib does not exceed 5 ft.

The height from floor to front eaves should not exceed 10 ft with a height at the back of 9 ft, as otherwise the weight of cobs will cause excessive packing with consequent sweating and heating and the development of mould in the cobs which occurs under these conditions. The length of the crib will depend on the area of maize. Roofing iron should be 8 ft long to provide sufficient overhang at the eaves.

An inside width of 5 ft is now recommended in place of the usual 6 ft of the standard crib. Cribs 6 ft wide were satisfactory with open-pollinated maize, cobs of which are harder to shell than those of hybrids, and for hand picking, when the cobs are put into the cribs in sacks and spread by hand. With more easily shelled types of maize and the use of an elevator which drops the maize through the open roof a considerable amount of loose maize falls into the crib and blocks some of the crevices between cobs. To get quick and satisfactory drying, therefore, the inside width should not exceed 5 ft. For every

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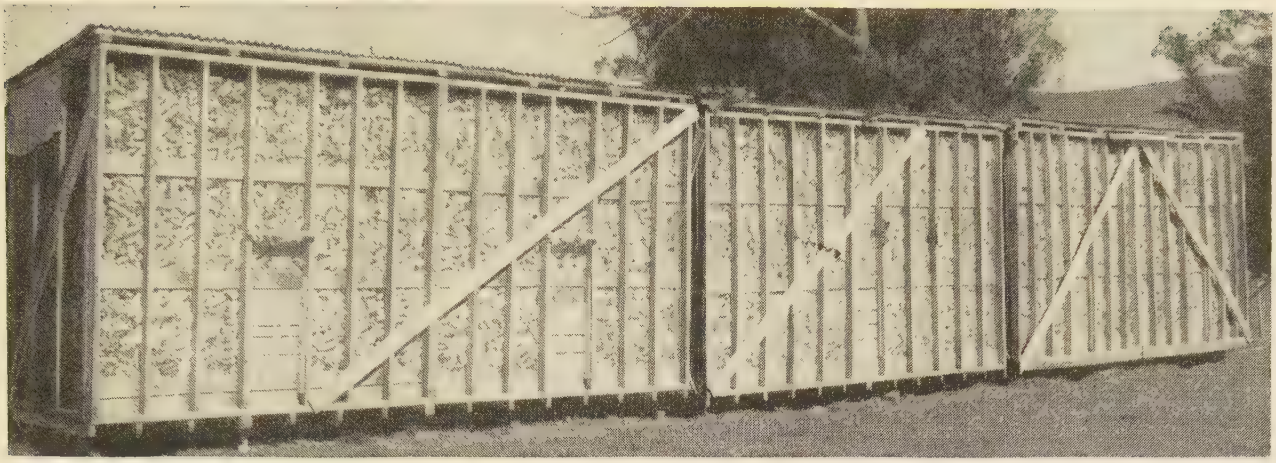


Portable maize cribs made with timber and wire netting.

3 bushels of shelled maize expected 3 cub. ft. of crib space will be required.

Portable Cribs

Maize growers are realising the importance of growing crops of maize in a rotation to reduce the risk of disease and prevent the spoiling of the soil structure through repeated use of the same area. A disadvantage of using new areas each year is that often it results in long hauls from field to crib and unnecessary damage to the field containing the crib. This is obviated by the use of cribs strongly built in short sections which can be transported from paddock to paddock.

Each section is built on 9 in. x 4 in. floor bearers curved at the ends to form skids. They are 12 ft to 15 ft long, 5 ft wide inside, and 10 ft high in front and 9 ft high at back. As many sections are built as are needed to house the crop.

Apart from the fact that the cribs can be moved they have the advantage that in a year of a short crop or possibly a smaller acreage one unit can be discarded, which ensures that all cribs are more evenly filled and there is less chance of damage than where a large crib is only partly filled. The chief disadvantage of a portable crib is that the floor is nearer to the ground than is desirable where flooding is a possibility, but this is easily outweighed by other considerations.

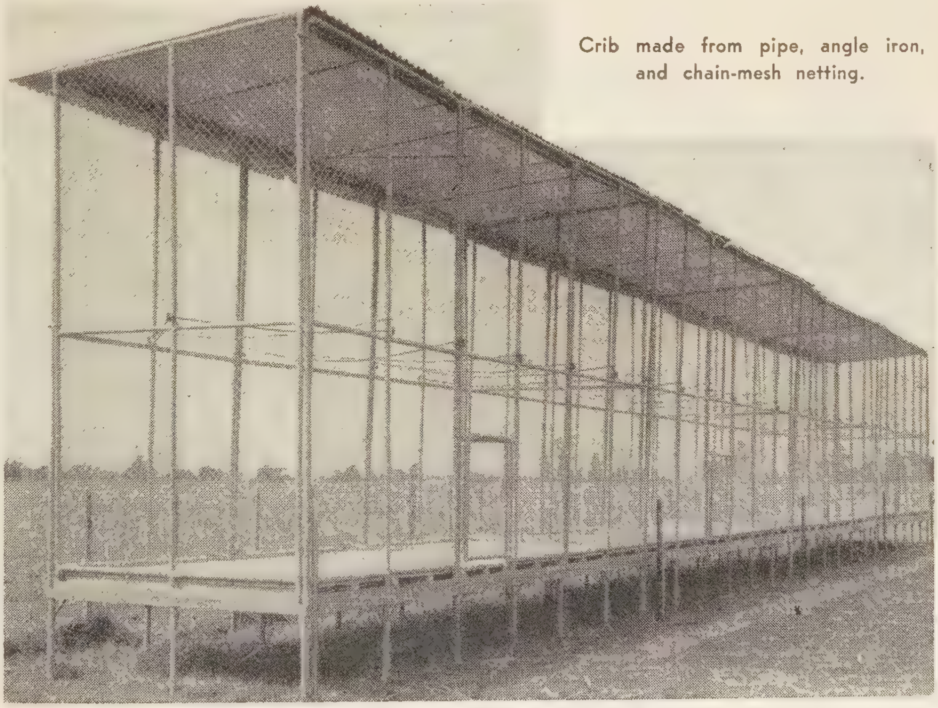
Steel Cribs

The latest development in crib construction is the use of 2 in. x 2 in. x 3/16 in. angle iron and 1¾ in (outside diameter) pipe with brackets of 1 in. pipe. The floor is wooden and the cribs are made in 6 ft 6 in. sections. The whole thing is prefabricated and can be bolted together to gain the length desired. As yet it is too early to comment about the durability of these cribs, but the design is sound, except that they are covered with 1¼ in. chain mesh netting, a gauge which is far too wide.

Seed

The use of what are known as open-pollinated varieties of maize for both grain and forage production has been discarded throughout the U.S.A. and in many other maize growing countries as a result of the development of much higher yielding, more vigorous, and uniform types of maize which have been produced by plant breeders and are known as hybrids. Most countries growing large areas of maize have established breeding centres for the production of hybrids suitable to their climatic and soil conditions, and seed for commercial use is grown under contract.

Because of the relatively small acreage of maize in this country and



Crib made from pipe, angle iron, and chain-mesh netting.

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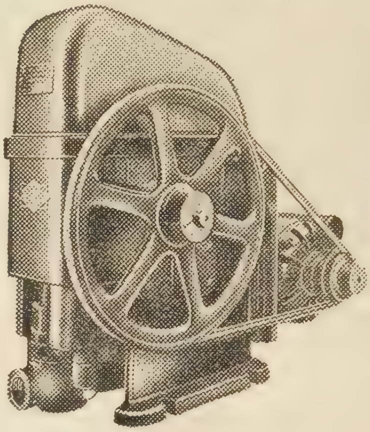

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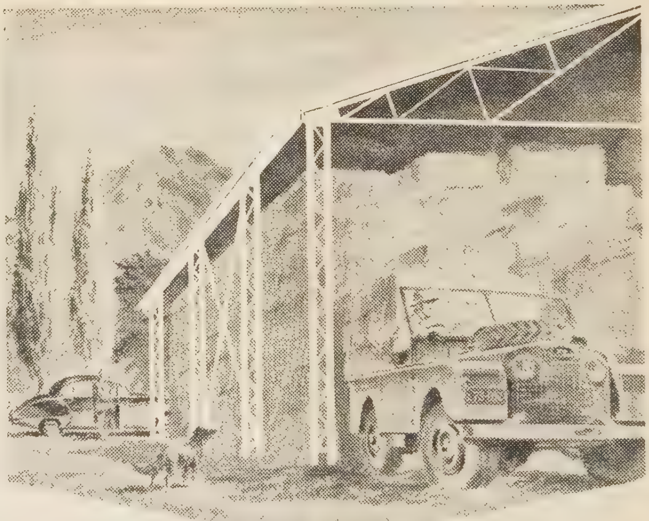

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the high cost of maintaining a breeding centre the Department of Agriculture has taken advantage of the wide selection of hybrid maize available in the U.S.A. and has through trials selected hybrids suitable for New Zealand. The Department imports sufficient seed of the single-cross parents of the selected hybrid to grow enough double hybrid seed for commercial seed requirements.

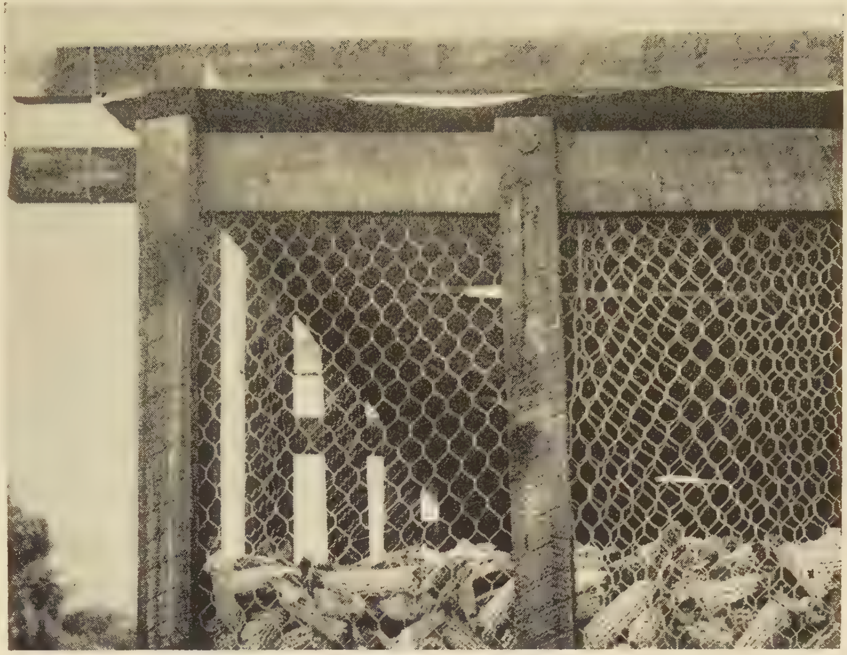
The growing of the double hybrid is carried out by contract growers under supervision, and after careful sorting, grading, and cleaning the hybrid seed is made available to growers through merchants. New and improved strains of hybrids are continually being produced by plant breeders in the U.S.A. and trials are being continued by the Department with a view to selecting still better strains for New Zealand.

The first variety made available under this scheme, Pfister 360, was very popular with growers for several years. A second variety, W643, because of better disease resistance, stronger stalk, and higher yield has now largely replaced Pfister 360 except on soils where slightly earlier maturity is an advantage. A third variety W575 has been produced for sowing first in 1960 to provide a still earlier maturing maize for use in less suitable climates or where farmers want to take two crops in succession, such as peas for canning and maize, from the same paddock in the one year.

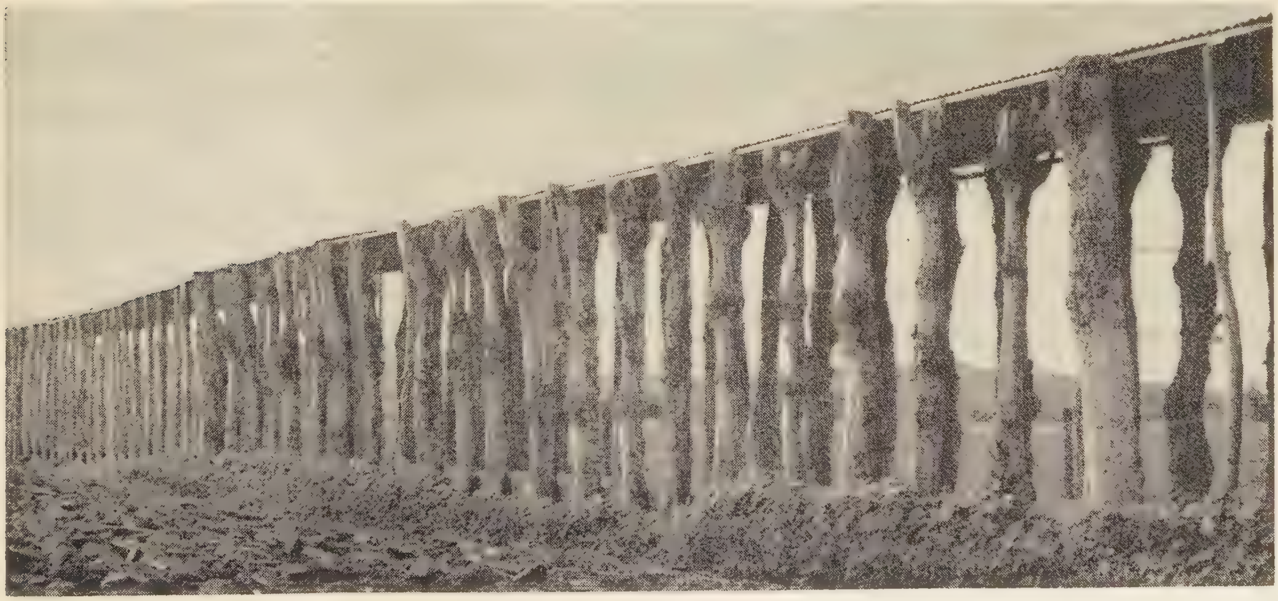
Merchants import seed of a few hybrids direct from the U.S.A.

The double hybrid, provided the selection is made of a type that has a maturity period which fits into the growing season of the district in which it is to be grown, has many advantages over the old, open-pollinated varieties. Among the most important are higher yield (up to 30 per cent), more uniformity in type of growth, height, number of ears, and grain size and colour, greater vigour of seedlings, and easier husking and shelling. The hybrids are also selected for resistance to disease and for strength of stalk. Further improvements along these lines are continually being made.

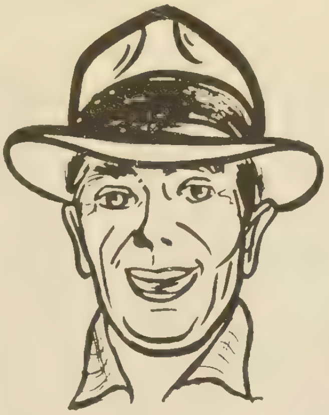
However, one very important difference between hybrids and the old varieties is that the former lose their vigour rapidly if grown on from seed saved from a crop in the field. This has resulted in a standard practice overseas of growers buying fresh seed



Method of securing roof of maize crib with 4 in. x 2 in. cross-pieces wired together at the ends. This is done to avoid nail holes in the roofing iron.



Crib made with poplar poles, which have rooted and have just been pruned.



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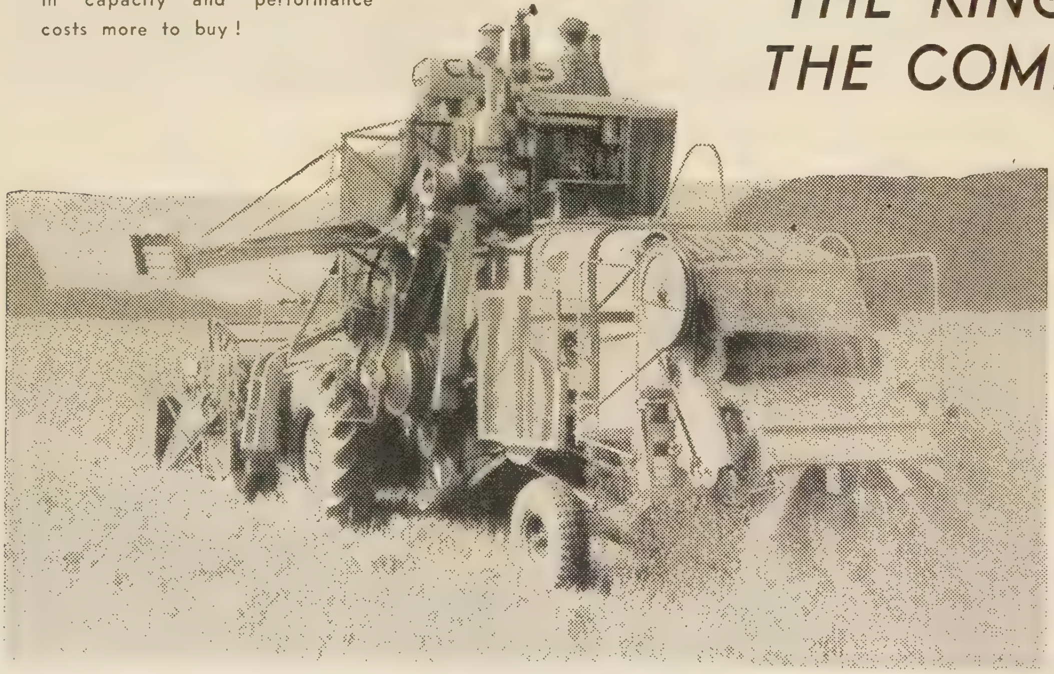

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of the double-cross hybrid every season; New Zealand growers of hybrid maize varieties should very definitely do the same.

Diseases

The common practice of growing maize year after year in the same paddocks has caused a gradual build-up in the soil of various fungous diseases. To some extent the effects of this have been restrained in Poverty Bay by silting from river flooding of many of the areas concerned.

Over the last three years, however, the fruits of this practice have become a danger to economic maize growing, owing to the rapid spread of some diseases. Though the Department of Agriculture is already taking all possible steps to minimise the effect of diseases by the selection of resistant hybrids, this cannot be wholly successful until farmers adopt a modern attitude toward crop hygiene and the rotation of crops.

Head Smut

Head smut (*Sorosporium reilianum*) is still giving trouble where no attempt at sensible crop rotation is made. Under these conditions, infection of over 20 per cent of mature plants has been observed and as very few infected plants are able to produce any grain, it can lead to serious loss of yield.

The obvious signs of this fungus appear after flowering, when the tassel or the cob or both become transformed into an unsightly ball of soot-like spores.

The spores infect the soil, where they may survive for some years and re-infect following crops.

Control: Emergence of the crop is improved by using seed treated with a fungicide, but the disease can gain entry to the plants at any stage of growth, especially through damaged roots. For this reason deep scarifying should not be done in infected areas.

The most effective control is to spell the paddock from maize for not less than five years and then introduce rotational cropping to avoid another build up of spores.

Leaf Blight

Leaf blight (*Helminthosporium turcicum*) was first noticed in Poverty Bay in 1953, since when infection has fluctuated in direct relation to weather. Crops harvested after the exceptionally dry summer of 1957-58 were virtually free of the disease. Traces of leaf blight have also been found in Bay of Plenty and South Auckland. Proper rotation of crops, control of weeds, and early ploughing after harvest would probably prevent the spread of the disease in these areas.

The symptoms of leaf blight ordinarily become evident about January as elongated, straw coloured, dry blotches on the leaves. At first these blotches are small, ½ in. or less long, but they enlarge rapidly and extend until the whole leaf has a scorched appearance.

Leaf blight is spectacular in epidemic form, but is not perhaps as important as growers now believe. If the weather is suitable and young plants are attacked, much damage can be done. Early maturing varieties seem particularly susceptible. Heavy attacks appearing from February onward, though certainly reducing crops, do not damage the yield as severely as would be expected from the appearance of the foliage. Moreover, many crops which have had a comparatively light infection may also show much "firing" of foliage due to nutritional deficiencies or lack of moisture, but leaf blight is blamed for all the damage.

Shelling maize.

Control: The most effective long-term means of controlling the effect of leaf blight is by use of resistant varieties. Wisconsin 643 has definite possibilities in this way. On a general and short-term basis every endeavour should be made to carry a fire through the maize stubble as soon as harvest is complete and to plough deeply immediately afterward.

Care should be taken to sow on a well prepared seedbed and not until the soil is sufficiently warm to give quick germination and continuous growth. Slow germination and checking of growth caused by a cold snap after too early sowing predispose young maize plants to attack.

Rotation of crops should always be practised, a new maize paddock yearly being preferable. Certainly not more than two crops should be grown in succession.

Stalk Rot

Stalk rot (*Gibberella* and *Fusarium* spp.) infection is increasing in Poverty Bay and causes most of the lodging in maize. Apart from causing stalk rot in fairly mature plants, the fungi can attack seedlings and cobs.

Fungi of this type cause considerable loss in the early growth in some seasons from seedling blight, whereas in others they are of little or no importance. Seed treatment is effective where the crop is sown on a clean paddock, but is of less value in sowings which follow infected maize.

Gibberella infection of seed may cause very patchy stands and much seedling blight in early sowings, especially where cold weather follows sowing.

If young diseased plants are carefully dug out, the kernels will be found to be of a characteristic reddish colour with a dark brown spot. On mature stalks the infection, usually close to the ground, shows as a brownish area sometimes all round and sometimes on one side only. In the later stages this infection causes the affected plant to die earlier than healthy ones and finally to fall over at the point of infection, causing the typical stalk break.

Control: The disease can be controlled by seed treatment and by the planting of maize in land out of pasture or after a crop other than maize or other cereals, which also carry *Gibberella* spores. Burning of crop residues, including chaff, husks, and shelled cobs, followed by deep

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ploughing, assists materially in checking this serious disease.

Adequate supply of the essential elements, such as nitrogen, potash, and phosphate, will materially assist the plants to resist fungi.

Cob Rot

In humid autumn weather cob rot, caused by the fungus *Nigrospora spherica*, which attacks cobs only, can lead to disappointing yields from an apparently healthy crop. It has the effect of cutting off translocation of nutriments through the cob to the grain, so leading to partial starvation and shrunken grain. No economic control is known, but good husbandry leads to better yields, even in the presence of the disease.

Insect Pests

Wireworms

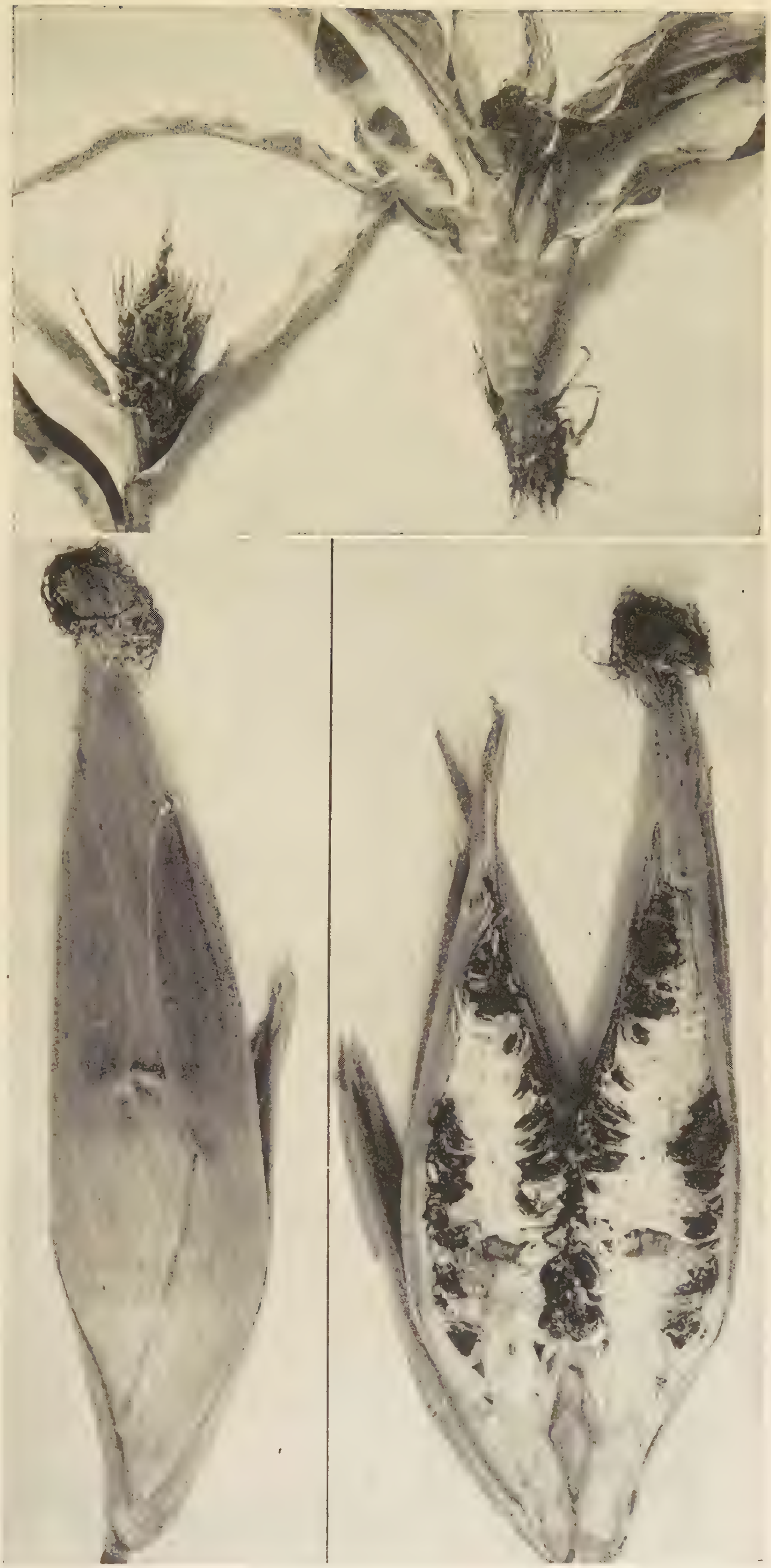
Wireworms can attack the crop from the moment the seed is sown. Generally they are worst in areas freshly ploughed out of pasture, but can also be troublesome on areas which have been cultivated longer. The creamy insects with brown heads are the larval form of the click beetle. They exist in the larval stage for from three to five years (spent entirely underground). The insects feed on the seeds, roots, and tubers of various plants.

An efficient method of protecting maize crops has been devised in Poverty Bay. A low volume spray outfit is mounted on the tractor at planting, but instead of spray being delivered through the boom two nozzles are fitted into separate plastic tubes and one is attached to the rear of each planter shoe so that the jets spray insecticide into the soil with the seed. This leaves a protective band exactly where it is wanted and reduces the often unwarranted cost of an overall spray. Two pints of 20 per cent DDT emulsion in 8 to 10 gallons of water for every 220 chains of row (1 acre) has been found effective. The amount of water might with advantage be increased.

Cutworms

Cutworms are one of the chief insect pests in Poverty Bay. These caterpillars attack maize at almost any stage from 4 to 18 in. high, cutting the stalks off neatly close to the ground and leaving plants lying beside their roots. Cutworms do not appear to eat foliage.

Good kills have been obtained by spraying the bases of rows with 20 per



Smut infection: Upper—Typical → infection of tassel (left) and distortion of plant due to infection (right). Lower—Thickened base of cob (left) and cob split to show infection (right).

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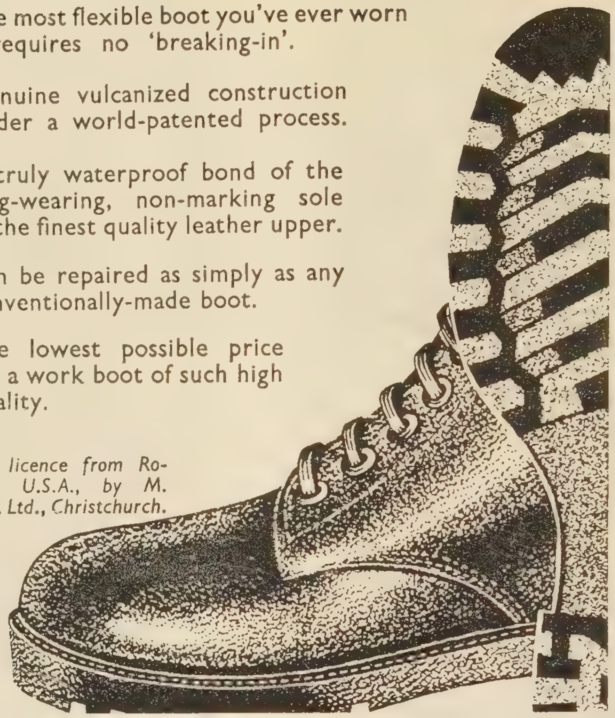

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cent DDT emulsion at 2 pints per acre used with 15 to 20 gallons of water.

Poison baits have also been effective where it is impracticable to spray. These are made by mixing 2 lb of 16 per cent lindane with 100 lb of bran and 2 gallons of S.A.E. 20 or 30 motor oil. The mixture is used at 10 to 15 lb per acre.

Green Vegetable Bugs

In recent years green vegetable bugs have become widespread in all maize growing districts. They puncture the milky grains and feed on the juices. The damaged grains usually appear to heal over and not suffer as much loss of weight as one would expect, but occasionally mould gains access through the wound and destroys the grain.

Weed-free crops rarely harbour many vegetable bugs, but those infested with such weeds as nightshade, fathen, and amaranthus can become a mass of bugs. Balanced against the damage done, aerial spraying would hardly seem economic, but control by parasites may yet be gained.

Army Worms

In conditions which favour them army worms can devastate crops. Dense populations can build up by January or February and, if unchecked, may strip crops of every vestige of green leaf. These caterpillars do not normally eat the grain, but if food is running short, they will nibble maize in the milk stage.

Crops infested with grassy weeds such as barnyard grass or paspalum are favoured breeding grounds. Now that dieldrin cannot be used, baits containing less harmful substances such as malathion may be used. Bran or mash (25 lb), molasses (4 lb), and lindane ($\frac{1}{4}$ oz) or malathion at a lower rate can be used to make baits. Crops must be very carefully inspected to detect army worms, as they may leave outside rows untouched.

Angoumois Moth

The angoumois moth (*Sitotroga cerealella*) is a serious pest of maize, wheat, rice, sorghum, etc., in many countries. Though mainly a storage pest in whole grain—it does not attack milled products—it may attack maize at the milk stage and later.

Before 1959 there was only one report of it in New Zealand, at Levin in 1921. No information other than its identification there now exists.

In autumn 1959, however, during some late shelling of 1957-58 crops many cribs were found to be badly infested with this moth, grain being hollowed out with much loss of weight. When bagged it heated up badly.

The adult moth is about 7/16 in. long and light tan with a few black pepper-like specks on the wings. The wings, which when fully extended are about 11/16 in. across, are folded against the body and have a distinct fringe of hairs.

Cutworm damage in maize. The caterpillars cut the stalks off neatly close to the ground, leaving the plants beside their roots.

Moths mate soon after emergence and over several days lay up to 400 eggs, either singly or in groups of up to 30. When an egg hatches, the the young larva bores straight into the grain, where it spends its entire larval and pupal life, only emerging as an adult moth. The time taken by this cycle is directly related to average temperatures. During winter it may be as long as 118 days, but in summer as short as 42 days.

The fact that this moth can lay its eggs in the standing crop and can live and reproduce within the confines of a maize crib makes it a dangerous pest.

The source of contamination for new crops lies in adjacent infested cribs which are not shelled until after the new maize is in a vulnerable condition. Many moths are disturbed by shelling and fly or are blown to the standing crop.

After shelling, all cribs should be thoroughly cleaned and sprayed with DDT. Particular attention should be given to the ground underneath the crib and the underside of the floor.

Storage Pests

The most common storage pests are grain weevil, Mediterranean moth, and Indian meal moth. Occasionally grain weevil will appear in cribbed maize. The best control then is to shell the grain and fumigate it, clean up underneath and round the crib, and spray the crib and surrounding area very thoroughly with a suitable insecticide.

Commercial grain stores wage a continuous battle against the three pests mentioned and object to having infested grain dumped into their stores without warning of its condition.

Importance of Good Husbandry

No attempt has been made in this article to give a complete list of diseases and pests to which maize is subject in this country. Those mentioned are merely the most common and damaging.

The diseases we have at present are all fungous. As it is neither practical nor economic to control them by spraying, good husbandry and adequate nutrition are essential to give the crops sufficient resistance to withstand attack and still produce good yields.

Insecticides should be used with discretion, as every application means the death of many beneficial insects as well as the pest aimed at. Autumn ploughing followed by early and thorough cultivation can do a lot toward reducing cutworm and wireworm infestations, and weed-free crops will generally harbour fewer vegetable bugs or army worms than weedy ones.

ROUND THE RESEARCH STATIONS

Current Work and Findings in Department of Agriculture and Department of Scientific and Industrial Research Trials and Experiments

Winchmore

Head Losses in Irrigation Ditches

It is becoming common practice for irrigators to design their paddock layout so that several checks have their sills on the same level, enabling these grouped checks to be irrigated simultaneously. However, if races are badly managed, head losses can mitigate against even flow down all checks. Results of investigations on an extremely badly managed race and on a race in good condition indicate that head losses are negligible in the race in good condition, but in the badly managed races losses were as high as ½ to 1 in. over each check.

An area has been set out to investigate efficiency problems under border check irrigation. Specially designed headgates have been constructed to minimise leakage losses. Water will be measured on to the area through a device which enables accurate control of flows to be made.

Wheat Research Institute

Hagberg Test for Sprout Damage in Wheat

The opportunity to test conclusions reached in earlier research and to carry out large-scale experiments in the utilisation of sprouted wheat has been afforded by the widespread and severe sprouting in South Island wheat this season. The Institute provided, at the request of the Flourmillers' Society, an emergency testing service, and tested well over 10,000 samples submitted by merchants on behalf of growers.

The Hagberg test is quite simple in principle. Two ounces of wheat are ground and made into "porridge" under standard conditions. If the wheat is sprouted, an enzyme called alpha amylase attacks the starch and the porridge is very fluid. This closely parallels the effect observed in bread baking, where loaves made from badly sprouted wheat may suffer crumb collapse.

The effect of this testing has been that millers have been provided with much better information than in the past, and as a result they have been able to buy very much more of the less severely damaged lines than would otherwise have been possible had their decisions been guided solely by visual examination.

The Institute will be better equipped to deal with a similar situation, if it ever occurs again, as a result of the intensive investigations now being carried out on both testing methods and on the effect of sprouted wheat on the operations of mills and bakeries.

Ruakura

Feeding Calves Once Every Second Day

Ruakura experiments in calf rearing over the years have been aimed at finding ways of simplifying methods, reducing feed and labour costs, and eliminating losses. The latest in a succession of such experiments has been the feeding of calves once every second day.

In this experiment 20 sets of identical twins were bucket-fed alike on 7 pints of whole milk once daily for the first month. During the second month one member of each set continued to be fed as before while its twin was given 8 pints in one feed every

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HEADING PHOTOGRAPH: A new headgate designed to minimise leakage losses in irrigation efficiency experiments at Winchmore Irrigation Research Station.

second day only. The calves were rotationally grazed on good pasture at all times and were weaned at 120 lb liveweight.

Results to date show that feeding calves once every second day delayed weaning by about six days, but resulted in a marked saving in labour as well as reducing milk costs by about 15s. a calf. The small differences in liveweight at two months in favour of the calves fed once daily were considerably reduced by six months of age. No additional health or rearing difficulties were encountered.

On these results the practice of feeding calves once every second day appears both feasible and efficient provided they are rotationally grazed on good pasture.

Soil Bureau

Soils and Dental Caries

The Soil Bureau has always been interested in the relationship of soil to animal and human health. Over the past five years or so it has been studying, in a team project with the Dental Research Unit of the Medical Research Council, possible correlations between different soils and the incidence of dental decay in children.

Selected areas in both the North and South Islands are being closely examined and considerable differences in the incidence of dental caries are being found. Interest is at present centred in the districts about Hastings and Napier.

A study of these districts during 1954 in preparation for fluoridation revealed considerable differences in the incidence of caries. Dental decay was noticeably lower among children raised in Napier compared with children raised in Hastings. Investigations showed that it was unlikely that fluoride was involved and that waters in the two areas had almost identical mineral composition. Both areas have a common milk supply.

What does distinguish them is the area of previously saline soils close to Napier which were raised by the 1931 earthquake. Market garden soils from the Napier Lagoon area have been shown to differ considerably from the market garden soils of the Heretaunga Plains.

The micro element composition of vegetables from these market gardens reflected the soil differences. In general vegetables from the Napier Lagoon area were higher in molybdenum, aluminium, and titanium and lower in copper, manganese, barium, and strontium. Dental literature contains a number of reports of investigations involving animals and humans where it is proposed that molybdenum may be a factor affecting dental caries.

Since dwarf french beans showed most of the micro element differences, they were grown in the two areas from a common source of seed for an experiment with rats. This experiment was carried out in cooperation with the Nutritional Research Unit (of the Medical Research Council). The rats were fed a basal diet designed to produce caries. Mineral ash from beans was then fed as a supplement. The results of this experiment were quite encouraging:

1. Rats on the basal diet had a high incidence of caries.
2. Rats on the basal diet supplemented with ash from Hastings beans had a high incidence of caries.
3. Rats on the basal diet supplemented with ash from Napier had a significantly lower rate of caries.
4. Rats on the basal diet supplemented with Hastings ash and sufficient molybdenum to bring it up to the same level as in the Napier ash had a reduced rate of caries, though not as low as that of the rats given ash from the Napier beans.

The pattern for caries obtained in this rat experiment appears similar to that noted for children; that is, Napier children have a lower incidence of dental caries than Hastings children. Several lines of investigation on this problem are in progress.

Fruit Research Division

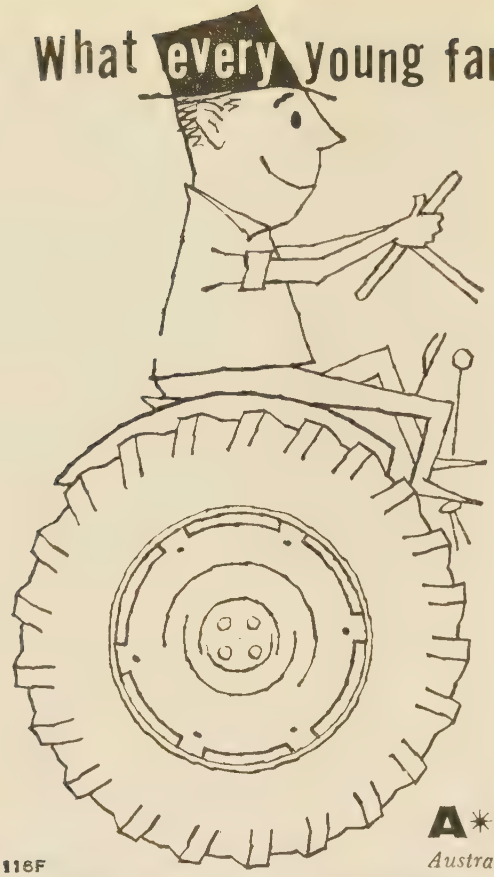
Control of Scald in Stored Apples

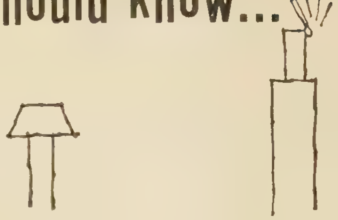
Superficial scald of apples is one of the biggest problems in their cool storage. First-class fruit stored during March or April appears to be keeping in excellent condition until it is removed in September or October. Then, within a week, a high percentage of apples may develop large, dark brown, unsightly blotches which make the fruit useless for the fresh fruit trade. Injury is confined to the skin, where a few layers of cells die, and affected apples can be used for processing.

Fruit Research Division has been searching for an effective control for many years. Various modifications to orchard practice have reduced losses but have by no means eliminated the disease. In 1958 Dr Smock, of Cornell University, visited New Zealand as a Fulbright Scholar and gave us much information about his discoveries of chemicals that would control scald. This gave new impetus to the work here, and it was shown that both diphenylamine and ethoxyquin would control scald on local varieties. Ethoxyquin is the less effective of the two materials, but approval to use it in stock foods had already been secured. Last September ethoxyquin was cleared by the U.S. health authorities for use on apples. When it was shown that residues on our varieties were below the tolerance set for America, the New Zealand Department of Health approved the use of ethoxyquin on apples, provided residues did not exceed 3 p.p.m. fresh weight.

In the season just finished the New Zealand Apple and Pear Marketing Board has by the new treatment protected some 50,000 loose cases of apples against scald.

What every young farmer should know...





Every young farmer should realise that good farm management depends on good cash management. He must also realise that a cheque account is a necessity. He should know too, that A.N.Z. Bank having concentrated on farming business for over 120 years are best equipped to handle it. Your nearest A.N.Z. Bank manager will be only too glad to help you with the opening of a cheque account, and he can also give you helpful information on the wide range of other A.N.Z. Bank services.

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9.30

Town Supply Herds Certified Clear of Reactors to Tuberculin Test

DURING June the following town milk suppliers were issued by the Department of Agriculture with clear herd certificates declaring that their herds are free of reactors to a tuberculin test.

To qualify for a clear herd certificate a supplier's herd must have no reactors to a tuberculin test of the whole herd. A herd comprises all cattle over six months of age depastured or kept on one property and includes dry or other stock from the property temporarily on a run-off. Where two or more herds share a common run-off all the herds using it have to be tested before any of them can qualify for clear herd certification.

In the list below the figures after each supplier's name and address are the number of animals tested and these are followed by the date of the test.

These herds will be recorded in the New Zealand Register of Clear Herds, compiled by the Department of Agriculture.

ADAMS, R. D., No. 1 R.D., Outram, 32, 29/5/61
ARCUS, I. O., School Rd., Te Horo, 114, 7/6/61
BAIN, J. K. M., Glover Rd., Hawera, 44, 13/6/61
BANKS, G. J., Coutts Island, Christchurch, 49, 6/6/61
BARNETT, C. A., c/o Post Office, Stirling, 65, 27/3/61
BATES, D. T., Airport Rd., Wanganui, 10, 17/3/61
BEVERIDGE, A., Momona, No. 1 R.D., Outram, 64, 13/3/61
BICHAN BROS., Riverside, R.D., Kaitangata, 99, 1/6/61
BINT, C. W., Richmond Rd., Lepperton, 126, 13/6/61
BIRD, T. A., Ihakara, R.D., Levin, 61, 20/6/61
BISHOP, R. C., Richmond Rd., Lepperton, 96, 20/6/61
BLAKE, C. J., Main North Rd., Otaki, 156, 6/6/61
BLAKE, D. C., Main North Rd., Otaki, 103, 6/6/61
BLUNDELL, A. E., North Rd., Clevedon, 83, 31/1/61
BLUNDELL, J. C., North Rd., Clevedon, 73, 30/1/61
BLYDE, H. E., Wortley Rd., Lepperton, 222, 9/5/61
BOON, C. W., Sutherlands Rd., Halswell, 61, 22/6/61
BOVIS, A. H., Heatherlea, R.D., Levin, 51, 6/6/61
BOYS' TRAINING CENTRE, Private Bag, Levin, 95, 19/6/61
BRAY, A. R., and CO., Fernhill, 3 R.D., Napier, 63, 23/6/61
BROOKLET FARM, c/o Lewthwaite, Chalmers St., Oamaru, 72, 22/5/61
BROSNAHAN, J., Blueskin Rd., Port Chalmers, R.D., 29, 20/6/61
BROWN, C., Owhanga, 90, 10/6/61
BUNN, G. N. W., Tayforth, Wanganui, 83, 17/3/61
BURNSIDE, G. H., Ardmore, R.D., Papakura, 127, 30/5/61
BURROWS BROS., Trices Rd., Halswell, 67, 25/5/61
BURROWS, F. L., P.O. Box 26, Amberley, 51, 20/4/61
BYLES, D. R., Main South Rd., Hangatiki, Otorohanga, 111, 15/6/61
CAMPBELL, J. E., Rerewhakaaitu, 3 R.D., Rotorua, 101, 19/6/61
CARSWELL, A. A., Karaka North Rd., No. 1 R.D., Papakura, 91, 6/6/61
CHAPMAN, J. L., No. 1 R.D., Port Chalmers, 41, 12/5/61
CHAPMAN, R. D., Willowby, No. 3 R.D., Ashburton, 33, 22/6/61
CHARMLEY, J., Waitarere Beach, Levin, 40, 9/5/61
CHISHOLM, F., No. 7 R.D., Waimatua, 39, 19/6/61
CHRISTENSEN, R. M., 1 R.D., Hamilton, 143, 22/6/61
CLIFFORD, H. E., Muhunoa East Rd., Ohau, 68, 30/5/61
COLES, L. B., Kuku, Ohau, 56, 30/5/61
COONEY, J. J., Prices Rd., Papatoetoe, 59, 19/6/61
COWIE, E. W., Paretai, R.D., Balclutha, 118, 16/5/61
CHRISTCHURCH DAIRY CO. c/o D. H. Alexander, Trices Rd., Halswell, Christchurch, 47, 22/5/61
CHURSTAIN, W. J., P.O. Box 21, Manganehi, 97, 25/5/61
CRAIG, J., Main Rd., Paerata, 102, 2/6/61
CROMBIE, J. G., Kennington, No. 1 R.D., Invercargill, 50, 31/5/61
CROWE, F. T., Elsham Rd., Lepperton, 82, 12/6/61
CROZIER, E. T., 45 Croziers Rd., Christchurch, 28, 18/5/61
CUDBY, D. J. and J. B., North Rd., Manakau, 87, 20/6/61
CUNNINGHAM, G. D., Paretai, R.D., Balclutha, 44, 19/5/61
DAVIDSON, W. G., Whenuka Rd., Hawera, 92, 26/6/61
DEADMAN, A., Piopiotea, Taumarunui, 54, 21/5/61
DIPPIE, W. J., No. 9D R.D., Oamaru, 47, 18/5/61
DOLAN, T. C., Grahams Rd., No. 4 R.D., Tinwald, 47, 29/5/61
DONALD, A. J., Estate of, Airport Rd., Putiki, 207, 13/6/61
DONALD, C. S., Main North Rd., Belfast, Christchurch, 135, 22/5/61
DONNELL, H. A., 389 New Brighton Rd., Christchurch, 29, 30/5/61
DONOVAN, M. J., P.O., Meeanee, 75, 29/5/61
DUFTY, D. J., Runciman, R.D., 54, 15/5/61
EASON, W. C., No. 1 R.D., Waitati, 42, 26/5/61
EDER, W. B., Kaiapoi, R.D., Ohoka, 15, 12/6/61
ELLETT, H. C., Ihumatao Rd., Mangere, 76, 30/5/61
ELLIOTT, A. R., Swamp Rd., Kaitangata, 69, 5/6/61
EVANS, T., Te Arei Rd., Sentry Hill, 134, 20/6/61
FERGUSON, I. M., Powell Rd., 1 R.D., Hamilton, 110, 23/6/61
FERGUSON, J. D., Edendale-Kamahi, R.D., 73, 13/6/61
FINCH, G. W., Kaitangata, R.D., Balclutha, 73, 19/5/61
FLEMING, Mrs B. E., Beach Rd., No. 1 R.D., Papakura, 67, 23/5/61
FOWLIE, A. G., Waiau Pa, R.D., Patumahoe, 75, 6/6/61
FRAME, J. L., Dumbarton, No. 2 R.D., Miller's Flat, 101, 12/5/61
FROST, D., McLeods Bay, Whangarei, 30, 12/6/61
GARDNER, D. L., No. 5D R.D., Oamaru, 29, 2/6/61
GEANGE, H. A., and SON, Queen Street East, Levin, 111, 31/5/61
GILLETT, J. H., No. 4H R.D., Oamaru, 48, 26/5/61
GILLMAN, R. E., Waikuku, R.D., Rangiora, 76, 20/6/61
GILMOUR, J. B., Roxburgh East, 7, 12/5/61
GLOVER, C., No. 1 R.D., Balclutha, 64, 17/5/61
GOODING, R., 41 Mountain Rd., Eltham, 4, 6/6/61
GOODSIR, E. W., Otanomomo, No. 1 R.D., Balclutha, 100, 10/3/61
GOWER, B., Kawakawa Bay, 21, 12/6/61
GRAHAM, W. M., Kawhia Rd., Kawhia, 85, 9/6/61
GRANT, H. H. and C. L., Wakefield, 80, 23/6/61
HALL, A., No. 2 R.D., Waitati, 45, 12/5/61
HAMILTON, S. M., Woodside, Outram, 38, 13/6/61
HAMPTON, S. C., 401 Wainoni Rd., Christchurch, 43, 26/5/61
HANCOX, J. T., No. 1 R.D., Waimatua, 44, 28/6/61
HARRIS, A., Tuturau, No. 4 R.D., Gore, 30, 19/6/61
HARRIS, S. J., Opaheke, 108, 14/6/61
HARRISON, A. T., 197 Alford Forest Rd., Ashburton, 48, 6/6/61
HAWTHORNE GROVE LTD., Lower Kokatahi, Hokitika, 44, 21/6/61
HAY, J. N., Lorneville, 44, 16/6/61
HELLYER, F. H., Macandrew Bay P.O., Dunedin, 38, 20/6/61
HEWITT, R. and L. E., Waikuku, R.D., Rangiora, 33, 20/6/61
HISCOKE, G. H., No. 5D R.D., Oamaru, 23, 20/5/61
HOLMES, W. C., Ramarama, R.D., 121, 2/6/61
HONORE, H. B., Hoggs Rd., Ohau, 137, 6/6/61
HORNE, A. R., Henley, No. 1 R.D., Outram, 30, 13/4/61
HOWELL, E. J., Whenuku Rd., Hawera, 51, 27/6/61
HOWELL, G. H., Tawera Valley Rd., Paraparaumu, 56, 19/6/61
HUNGER, W. C., Richmond Rd., Sentry Hill, 187, 15/6/61
HYFIELD FARM, c/o A. H. Sextus, Box 57, Manakau, 68, 29/5/61
JAMES, N. C., 4 R.D., Palmerston North, 170, 23/5/61
JARDEN, B. H., Eiffelton, No. 4 R.D., Ashburton, 56, 9/6/61
JONES, C. L., Goodson Rd., Hawera, 52, 6/6/61
JOYCE, J. M., Purakanui, No. 1 R.D., Port Chalmers, 82, 26/5/61
KILPATRICK, A., Blanket Bay, Port Chalmers, 44, 27/6/61
KILPATRICK, J. H., Blanket Bay, Port Chalmers, 31, 27/6/61
KIMPTON, A. F., Brookby, R.D., Manurewa, 111, 30/5/61
KIMPTON, G. R. O., Wattle Downs, Manurewa, 214, 2/5/61
KING, C. J., Lincoln, No. 2 R.D., Christchurch, 42, 23/5/61
KING, E. C., Tauriko, 1 R.D., Tauranga, 80, 14/6/61
KIRK, A. L., Paerata, 55, 13/6/61
LAKE COLERIDGE COW CLUB, State Hydro, Lake Coleridge, 14, 18/5/61
LAMBIE BROS., Lakeside R.D., Leeston, 94, 18/5/61
LAURIDSEN, I. P., Cryers Rd., East Tamaki, 49, 12/6/61
LAWRY, R. S., Box 52, Te Horo, 97, 29/5/61
LEGG, T., 524 Halswell Rd., Christchurch, 46, 25/5/61
LEIGH-McKENZIE, W. B., Opononi, 88, 5/6/61
LESLIE, M. B., Prebbleton, No. 2 R.D., Christchurch, 109, 2/6/61
LETICA, A., and SON, Runciman, R.D., 92, 9/5/61
LEWER, E. ST. C., No. 5 R.D., Feilding, 59, 12/5/61
LEWIS, S. H., 52 Grimseys Rd., Christchurch, 27, 15/5/61
LONGFORD PARK LTD., Great South Rd., Papakura, 98, 18/5/61
LUCAS, P. J., Harihari, 28, 21/6/61
LYNCH, H. J., Estate of, and Miss E. A. C., Box 2, Paekakariki, 40, 19/6/61
McCORD, C. W., Berwick, No. 1 R.D., Outram, 68, 13/4/61
McCORMACK, Mrs O. M., Hospital Rd., Te Kuiti, 15, 26/6/61
McDERMOTT, E. T., Junction Rd., Halswell, 98, 25/5/61
McDOWALL, C. H. and E., Rapanui Rd., Wanganui, 25, 19/6/61
McDRURY, L. P., and THORNLEY, A. G., 590 Halswell Rd., Christchurch, 64, 5/5/61
McGRATH, E. J., Kaiapoi, R.M.D., Christchurch, 34, 29/5/61
McGROUTHER, W. J., Tuturau, No. 4 R.D., Gore, 92, 13/6/61
McHATTIE BROS., Momona, No. 1 R.D., Outram, 42, 23/6/61
McLEARY, B. P., c/o Post Office, Stirling, 69, 27/3/61
McRAE, A., Blueskin Rd., Port Chalmers, R.D., 23, 20/6/61
MARSH, Mrs B. K., Egmont Rd., Hillsborough, 110, 29/5/61
MARSHALL, A. C., Toi Street, Otaki, 42, 13/6/61
MARSHALL BROS., Station Rd., Ohakune, 53, 19/6/61
MARSHALL, D. G., 29 Bank St., Amberley, 30, 20/4/61
MARSHALL, S. N., Halfway Bush P.O., Dunedin, 54, 20/6/61
MATTHEWS, H. C. M., Redoubt Rd., Papatoetoe, 91, 29/5/61
MIDGLEY, B. G., Kumeu, R.D., Hobsonville, 117, 1/6/61
MIDGLEY, T. L., Kumeu, R.D., Hobsonville, 102, 8/6/61
MILES, J. H. S., 168 Golf Rd., New Lynn, 24, 20/6/61
MILLAR, S. M., Clerkville, Kaiapoi, R.D., 56, 12/6/61
MILLER, D. S., and SONS, Momona, R.D., Outram, 184, 29/5/61
MILLER, R. R., Woodlands, Kaitangata, 81, 6/6/61
MITCHELL, W. J., Bush Rd., Mosgiel, 63, 13/5/61
MONK, O. A., Turoa Rd., Wanganui, 18, 19/6/61
MOORE, R. F., Ostrich Rd., Patumahoe, 77, 20/6/61
MORRISON, J., Matapouri, Whangarei, 86, 30/5/61

TOWN SUPPLY HERDS . . .

MUIR, J. B., Whataroa, 133, 21/6/61
MUIR, J. W., Tuturau, No. 4 R.D., Gore, 46, 19/6/61
MURPHY, W. L., Maxwelton St., Pine Hill, 32, 27/6/61
NEILL, A. D., Blakes Rd., Greenpark, 39, 9/6/61
O'SHEA, M. J., Estate of, P.O. Box 297, Whangarei, 153, 27/6/61
OWEN, S. R., Waiau Pa, Patumahoe, 118, 15/5/61
PALMER, S. J., Mackesey's Rd., Whangarei, 87, 20/6/61
PALMERSTON NORTH HOSP. BD., The Secretary, Box 607, Palmerston North, 139, 6/6/61
PARRY, L. J., Flat Bush Rd., Papatoetoe, 163, 10/6/61
PARSONS, G. A., Estate of, Lowcliffe, No. 4 R.D., Ashburton, 78, 29/6/61
PATERSON, J. A., and SONS, Opaheke Rd., Ponga, R.D., Papakura, 133, 26/6/61
PAYNE, D. J., Waiohanga Rd., R.D., Te Horo, 90, 29/5/61
PEASE, C. L. and J. C., 74 Richmond Rd., Lepperton, 51, 12/6/61
PENFOLD, F. A. H., Amberley, R.D., 76, 20/4/61
PERCY, H., Bethlehem, 2 R.D., Tauranga, 108, 13/6/61
PHILLIPS, C. G., No. 6 R.D., Palmerston North, 117, 20/5/61
PORTIS BROS., Airedale, No. 3 R.D., Oamaru, 132, 9/6/61
POWELL, T. G., Waitati, R.D., 43, 26/6/61
PRICE, G., Dudley Rd., Te Pu, Rotorua, 120, 20/6/61
PRINGLE, R. E. F., No. 9D R.D., Oamaru, 76, 19/5/61
QUIGLEY, A. W. and D. B., No. 2 R.D., Taitapu, Christchurch, 40, 4/5/61
RAMSAY, Mrs E., St. Albans St., Kaitangata, 3, 16/3/61
RANGIORA HIGH SCHOOL, East Belt, Rangiora, 51, 6/6/61
RAUMATI FARM, c/o Willocks, Stirling P.O., 122, 6/6/61
READ, D. I., Momona, R.D., Outram, 102, 15/5/61
REDMOND, V. J. W., Estate of, c/o N.Z. Insurance Trust Ltd., Rangitikei St., Palmerston North, 94, 26/5/61
REEVES, H. J., Riverside, R.D., Stirling, 53, 5/6/61
ROBERTS, L. C., Charles Rd., No. 1 R.D., Papakura, 46, 23/5/61
ROBINSON, G. J., Wainui, R.D., Kaukapakapa, 60, 2/6/61
ROBINSON, N. J. and E. J., Arahura, R.D., Hokitika, 77, 21/6/61
ROGERS, A. R., Estate of, Coes Ford, No. 4 R.D., Christchurch, 33, 23/5/61
SAMPSON, T. A., Loburn, Rangiora, 28, 20/4/61
SANDERS, J., 1 R.D., Tokoroa, 129, 13/6/61
SCARLETT, G. R., 1 R.D., Tokoroa, 97, 26/6/61
SCOTT, R., Centrewood, Kaitangata, 51, 16/3/61
SEARS, A. C., Oxford Rd., Okato, 71, 19/5/61
SHARPLIN, W., Maharahara, R.D., Dannevirke, 61, 6/6/61
SHAW and SHAW (No. 2 Farm), Gills Rd., Howick, 141, 23/5/61
SHERIDAN, P. J., No. 5 R.D., Palmerston North, 69, 12/6/61
SHERMAN, F. L., No. 9 R.D., Otatara, 53, 19/6/61
SIM, D. G., Karaka, No. 1 R.D., Papakura, 57, 29/5/61
SMALL, Mrs C., No. 5 R.D., Palmerston North, 32, 29/5/61
SMITH, J. A., 16 Smith's Ave., Papakura, 38, 16/6/61
SNELL, H. A., No. 3 R.D., Tutukaka, 73, 13/5/61
SONNE, C. F., No. 3 R.D., Ashburton, 46, 16/6/61
SPRATT, G. R. G., Paerata, 60, 6/6/61
STEWART, J. O., Foxton Rd., Levin, 113, 28/5/61
STEWART, W. A., Kaimatira Rd., Wanganui, 71, 19/6/61
STEWART, W. H., Riverside, R.D., Stirling, 135, 5/6/61
STORRIER, J. D., Buckleys Ter., Tinwald, 32, 2/6/61
STREVENS FARM TRUST, Pa Farm, Takanini, 346, 22/5/61
SUTHERLAND, I. and M., Henley, No. 1 R.D., Outram, 97, 13/4/61
THOMAS, J. A., and SON, Greenpark, No. 4 R.D., Christchurch, 58, 23/6/61
THOMPSON, C., Pukepoto, 110 R.D., Kaitaia, 75, 13/6/61
THOMPSON, Mrs L. J. P., Cottesbrooke, Middlemarch, R.D., 18, 11/5/61
THOMSON, L. R., and DAY, P. E., No. 3 Drain Rd., Fernside, Rangiora, 82, 30/5/61
THOMSON, W. G., Green Island Bush, Green Island, 66, 27/3/61
THORNTON FARMS LTD., Jeffs Rd., East Tamaki, 41, 30/5/61
TURNBULL, K., No. 1 R.D., Port Chalmers, 27, 12/5/61
TWEEDIE, C. E., Riverside, R.D., Mosgiel, 27, 22/5/61
VANDERLEY, I. and D. J., Waimatua, No. 7 R.D., Invercargill, 28, 26/5/61
VERNON, H. E., Whangapouri Rd., Runciman, 44, 29/5/61
WAIPIATA SANATORIUM, Orangapai, Waipiata, 50, 17/4/61
WALKER, S. J., 236 Malvern St., Dunedin, 70, 26/6/61
WALSH, J. J., Edendale-Kamahi, R.D., 86, 12/6/61
WARD, B. A., Valley Road, Raetihi, 58, 19/6/61
WARD BROS., R.D., Outram, 64, 13/6/61
WARDS, L. D., Tuturau, No. 4 R.D., Gore, 56, 13/6/61
WEBSTER, C. R., Alfriston Rd., Manurewa, 105, 30/1/61
WEIR, Mrs C. M., The Crescent, Stirling, 59, 5/6/61
WELLS, J. P., Airport Rd., Putiki, 108, 14/6/61
WESTON, I. W., and WATKINS, C. E., Lincoln P.O., 100, 4/5/61
WILDBORE, L. A., Potts Rd., Ihakara, Levin, 116, 26/5/61
WILLIAMS, A. G. R., Ohangai Rd., Hawera, 181, 12/6/61
WILLIAMS, H. R., Holmcroft and Worsleys Rd., Halswell, 87, 26/5/61
WILSON, J., No. 1 R.D., Outram, 96, 13/6/61
WILSON, L. W., "Edendale Farm", Belfast, Christchurch, 69, 29/5/61
WINIATA, L. K., Ross Rd., Maharahara, R.D., Dannevirke, 60, 29/5/61
WINIATA, Mrs R., Main Rd., Ohau, 108, 20/6/61
WINSTONE, A. M., Kidds Rd., No. 1 R.D., Papakura, 139, 29/5/61
WOODVUE FARMS LTD., Bluff Hill Rd., Runciman, R.D., 101, 6/6/61
WRENN, J. P., Oringi, R.D., Dannevirke, 119, 7/6/61
YUILL, G. W., Enfield, R.D., Oamaru, 84, 2/6/61

Cancelled or Suspended Certificates

The following certificates have been cancelled or suspended:

CHARLES, E. G., Karaka, No. 1 R.D., Papakura
CHILCOTT, N. H., 108 Smart Rd., New Plymouth
DALE, J. H., Rerewhakaaitu, 3 R.D., Rotorua
DORNE, J. J., Tararua Rd., Levin
FAIRWEATHER, H. J., 1 R.D., Hamilton
FARNDON HOHEPA FARM SCHOOL, Napier Rd., Clive
GEDDES, J. C., Green Island Bush, Green Island
HAWKEN, C. E., 26 Whau Valley Rd., Whangarei
HOOD, C. H. J., No. 6 R.D., Piaka Rd., Koputaroa
HOPE, W. R., Waikite Valley, 1 R.D., Rotorua
MacDONALD, K., Rototuna, 1 R.D., Hamilton
McFARLANE, I. C., Sandspit Rd., Warkworth
McLAY, G., No. 2 R.D., Waitati
MAXWELL, F. H., Hoggs Rd., Ohau
PATTERSON, J. A., Kilmog, R.D., Waikouaiti
ROBSON, R. F. and K. M., Brown's Rd., Drury
SHENNAN EST., c/o C. B. Reid, Berwick, No.1 R.D., Outram
STRUTHERS, J. R., Longlands, Box 406, Hastings
WILSON, M. G., Buckland Rd., Mangere

Restriction on Movement of Citrus Trees

OWING to outbreaks of citrus canker, the taking of any type of citrus trees, rootstocks, or seeds (but not fruit) from anywhere in New Zealand into the commercial citrus growing districts is now prohibited. This action has been taken, said the Minister of Agriculture, Mr Hayman, to protect the livelihood of commercial growers.

If citrus canker appears in an orchard, complete destruction of mature trees by burning is normally necessary. As it takes about 15 years for replacement trees to reach full bearing, this can be a serious blow to a commercial grower.

The latest restrictions, the Citrus Trees Diseases Regulations 1961, have been imposed because of outbreaks of citrus canker at Kohimarama, a suburb of Auckland, and at Manurewa, south of the city, in 1960 and the detection over many years of infected plants in Taranaki, chiefly at Waitara and New Plymouth.

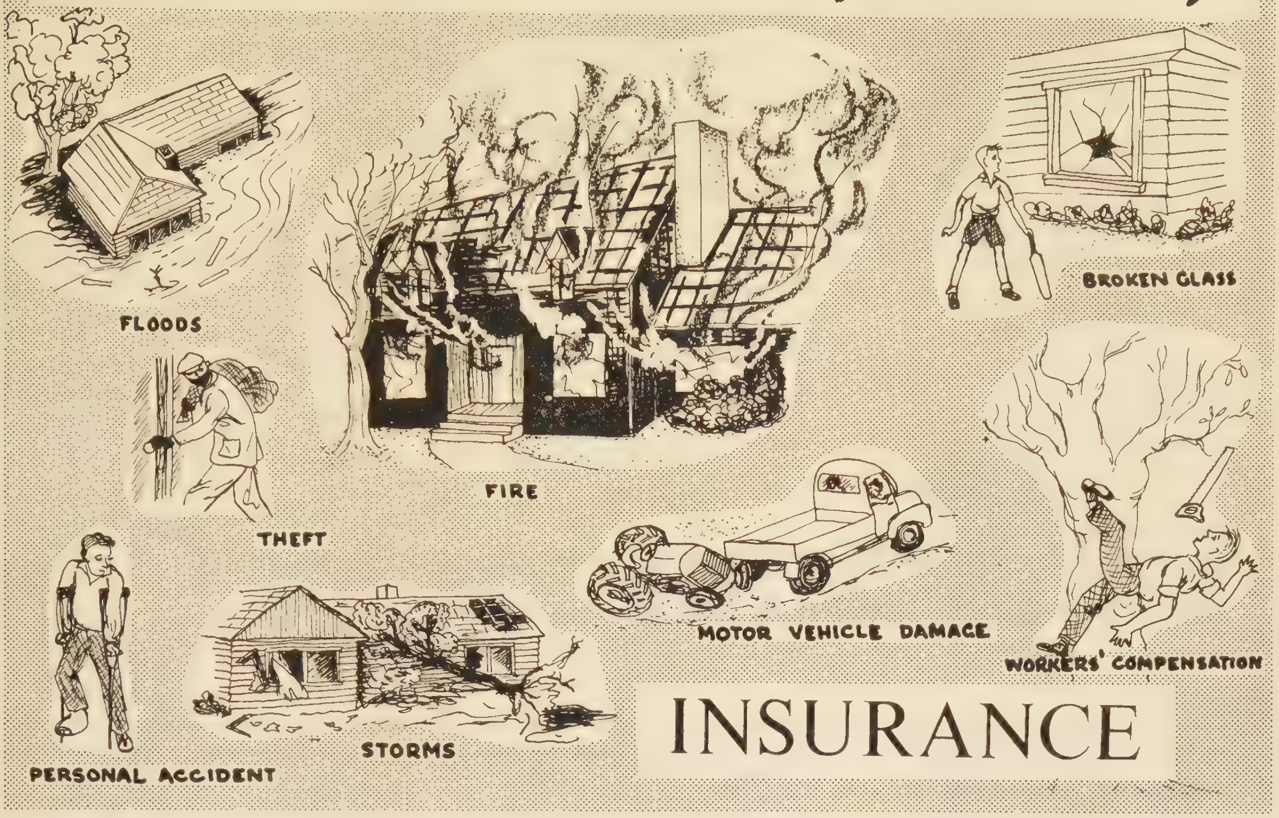
Further Safeguard

The regulations prohibit the movement of citrus trees, seeds, and rootstocks from any place in New Zealand to anywhere in the counties of Bay of Islands, Whangarei, Tauranga, Cook, and Wairoa and the borough of Wairoa. An earlier restriction, which remains in force, prohibited such movement into Auckland Province. The new regulations further safeguard commercial citrus areas by prohibiting movement of the citrus materials mentioned into the counties of Bay of Islands, Whangarei, Tauranga, Cook, and Wairoa and the borough of Wairoa from other parts of Auckland Province.

"The cooperation of every nurseryman, commercial citrus grower, and home gardener in the Auckland commercial citrus growing counties is essential for the eradication of citrus canker, in the control of which thousands of pounds have already been spent," said Mr Hayman. "No citrus growing country will accept our citrus fruit as long as the disease is known to exist here.

"Residents in the counties mentioned, from Bay of Islands along the east coast to Wairoa, should notify the nearest office of the Department of Agriculture of plantings of any citrus trees of unknown origin of which they have knowledge."

The Business Side of Farming



INSURANCE

By H. H. TOCKER,
Farm Management Officer, Department of Agriculture, Christchurch

THE farmer can insure against many hazards, some obvious and some obscure, which threaten his financial security. Because of the high investment in a farming enterprise, as full coverage against losses as possible should be obtained. Most insurance premiums are a legitimate running expense and qualify for taxation relief. On the other hand, an uninsured loss will be a capital loss, which is not a charge against income.

WHAT are some of the perils that beset the farmer in the course of his business, and what does he need to insure?

Fire

1 The obvious, of course, is fire. This can affect every part of his farming enterprise from buildings to livestock. But these can all be protected by a suitable insurance policy.

The standard fire policy covers the risk of fire, lightning, earthquake, and in some circumstances types of explosion.

Extensions may be obtained to cover other types of explosion, aircraft damage, self ignition, windstorm, water leakage, flood, riot, and civil commotion.

All buildings, plant and equipment, stocks, stores, crops, and livestock should be insured for their full insurable value, care being taken to see that the contents of every building are insured.

Stock housed indoors can be insured by a fire policy.

Crops can be insured in the field, when harvested, and in transit to buyer or broker while at the farmer's risk.

Plant and equipment used in the open should be insured under a floating policy.

Liability to Other Persons

2 Liability to other persons arising in connection with the farmer's business and premises (this is really his liability for negligence at common law). The farmer has responsibilities to every person who enters on his property, even to a limited extent for trespassers. This liability may arise from:

(a) Defect in buildings, fences, gates, private bridges, cream stands, and stock pens.

(b) Use of agricultural plant and machinery.

Farmers used to top-dress by hand

—today there's a better way

Top dressing by hand was slow, but the introduction of aerial top dressing assisted in the increased production of wool, meat and dairy products. Now we have more to export overseas. We have more to sell. The BNZ has a network of agents in overseas countries ready to advise on markets — assist transactions — help the N.Z. farmer to sell his products overseas at a fair price.

The BNZ looks to the markets of the world for the farmer

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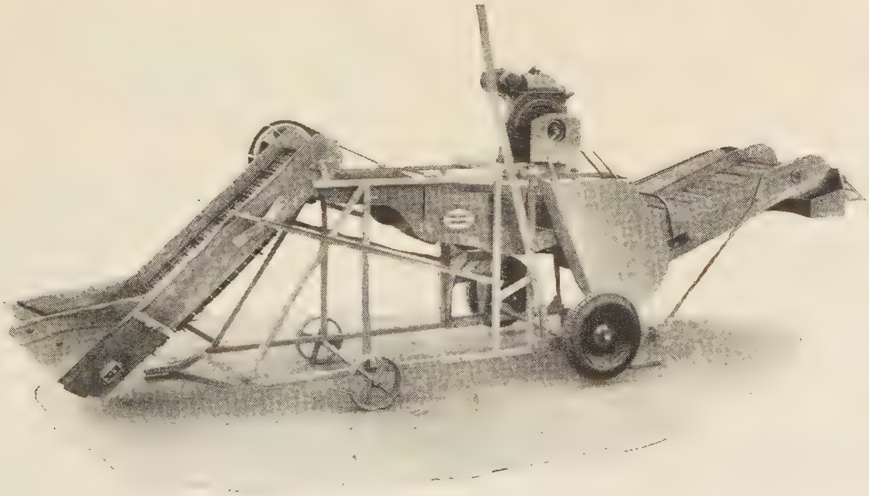

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MARTON.

Sole South Island:
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TIMARU.

(c) Animals straying.

(d) Dogs worrying sheep or poultry.

(e) Livestock being exhibited or competing at shows, led, driven, or ridden along any road or on property other than that of the farmer.

(f) Personal injury due to:
   (i) Fire spreading.
   (ii) Use of explosives or firearms.

(g) If hazard is likely from the use of poisonous sprays, it should be specifically mentioned when insuring.

(h) Any negligent act by a farmer or one of his employees.

Insurance against liability in these cases is available through a special "farmer's liability insurance". The standard policy provides indemnity in respect of accidents caused by any of the preceding and by standard endorsement automatically includes:

(a) Any liability arising from the loading or unloading of any motor vehicle, and

(b) (in certain circumstances) liability caused by any article falling from a motor vehicle.

A further extension can be obtained to include:

(a) Liability in respect of damage to property caused by fire or explosion.

(b) Liability arising from the use of aerial topdressing, that is:
   (i) To indemnify the farmer against liability in respect of the operation of independent aerial contractors arising out of aerial topdressing, poisoning (excluding poisons known as 1080 and 1081), or suchlike operations on his property.
   (ii) Provide indemnity to a farmer against his legal liability for claims for damages in respect of bodily injury and damage to property arising out of the operation of an air strip on his own or neighbouring farm, including bodily injury and damage to property caused to or by aircraft. Cover for these two contingencies may be obtained by extending the normal farmer's liability policy.

Workers' Compensation Act

3 Responsibility to his employees under the Workers' Compensation Act.

This is a statutory obligation to pay weekly compensation to an employee injured by accident (or suffering from an occupational disease) arising out of, and in the course of, his employment. The Act also provides for lump sum payments. There is also an unlimited liability at common law.

If the farmer neglects to insure, there are penalties provided by the Act, but the farmer's liability is covered when he delivers a wage statement to an authorised insurer in accordance with the Act. The form provides for the disclosure of the wages estimated to be paid in the ensuing year. The premium to be paid is computed from a schedule of regulation rates, and the premium so paid on the estimate is adjusted at the end of the year according to the wages actually paid during that year.

Vehicles and Implements

4 Loss of or damage to all types of motor vehicles and farm implements and liabilities arising from the use of motor vehicles, including responsibility to passengers riding in the farmer's vehicles.

There are two types of policies:

Commercial Motor Vehicle Comprehensive Policy

This policy is used to insure farm trucks and farm implements.

Restrictions apply to some types of vehicles and implements, but in the main the following cover can be obtained under a commercial policy.

(a) Loss or damage to the vehicle or implement.

(b) Indemnity for liability arising out of bodily injury including loss of life (not covered under Part V of the Transport Act, 1949) and damage to property including law costs.

(c) Claims by passengers can be included.

(d) Riot and civil commotion.

(e) Theft of accessories.

(f) Consequential claims in respect of personal injury to third parties.

Private Motor Vehicle Comprehensive Policy

In addition to the various covers mentioned above that are available under a commercial policy this policy might include:

(a) Indemnity for any relative or friend driving the vehicle with the insured's consent.

(b) £1,000 death benefit for husband or wife with certain medical benefits.

If the vehicle is not suitable for comprehensive cover, a third party only insurance should be arranged which provides indemnity against third party liability, but does not cover the vehicle itself.

Livestock

5 Accident to or death from disease of his livestock.

Livestock may be insured by a "special livestock" policy which includes cover for such risks as foaling, castration, transit, and exhibition at shows. Policies in their ordinary form provide an indemnity in respect of the loss of animals through death caused by accident or disease. One proviso is that the farmer must at his own expense make immediate arrangements for attendance by a qualified veterinary surgeon.

Personal Accident and Sickness

6 Accident and sickness of the proprietor.

The risks which threaten the farmer personally may arise from:

(a) Accidents due to:
   (i) Farm tractors and implements.
   (ii) Milking and shearing machines.
   (iii) Horses, bulls, and other animals.
   (iv) Electricity and electrically operated tools.
   (v) Firearms (pig shooting, deer stalking).

(b) Sickness and disease such as cowpox, undulant fever, leptospirosis, etc.

(c) Accidents which, though not connected with farmer's business, are part of his normal activities such as motoring, football, swimming, hunting, fishing, shooting, and mountaineering.

To offset incapacity from any of these risks the farmer has the choice of two insurance covers. The best policy a farmer can arrange to cover himself is an "accident (extended benefits) and all sickness" policy. This will guard him against most of the hazards listed above. If, through health or age reasons, he is unable to qualify for this type of cover, he should insure himself under an "accident (extended benefits) and specified diseases" policy which limits the number and type of diseases he may be insured against, but is still fairly wide in application.

Dwelling and Contents

7 Houseowner's and householder's insurance and all risks insurance.

The farmer's dwelling and its contents are not technically part of his farming business, but as any loss or damage happening to his home will affect his business, the farmer should cover the hazards to his house and its contents with those already mentioned.

A cover that can be arranged to protect his home is a "houseowner's" policy on the dwelling and a "householder's" policy on its contents.

Cereal aphids spread **cereal yellow dwarf virus** which causes serious yield reductions in wheat and other cereals. Use in 1960 proved Rogor 40 against cereal aphids. Rogor 40 is recommended as the most effective insecticide to reduce crop losses.

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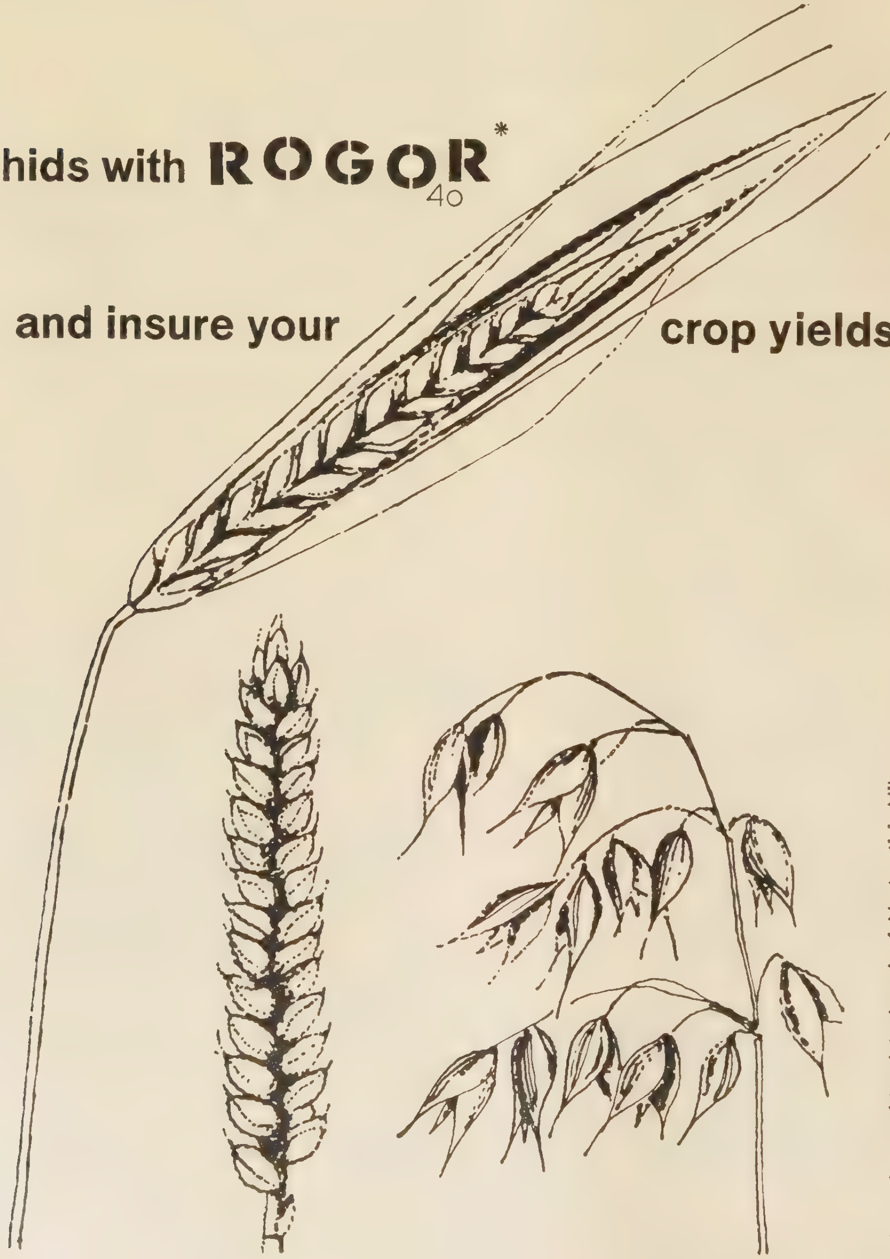


FISONS PEST CONTROL

* Rogor is a registered trademark of Montecatini, Milan

These policies will give him protection against:

(a) Fire, explosion, lightning, and thunderbolt.
(b) Storm, tempest, and flood.
(c) Riots or civil commotion.
(d) Aircraft.
(e) Bursting or overflowing water tanks, cisterns, pipes, etc.
(f) Burglary or housebreaking.
(g) Impact by any road vehicle, horses, or cattle not belonging to the farmer or member of his family.
(h) Liability to the public.
(i) Earthquake (under the Earthquake and War Damage Act).

Additional perils that refer only to a houseowner's policy are:

(a) Loss of rent.
(b) Accidental breakage of:
    (i) Fixed glass, external or internal, forming part of the insured buildings.
    (ii) Fixed wash basins, lavatory pans, lavatory cisterns, and sinks.

Additional perils covered only under a householder's policy are:

(a) Larceny or theft.
(b) Damage to mirrors other than hand mirrors.
(c) Hotel expenses.
(d) Compensation for death of insured.
(e) Accidental breakage of glass forming part of furniture.
(f) Property removed is covered under certain circumstances.

The householder's policy does not cover **all** perils. The cover on valuables, for instance, is restricted to the above contingencies, and the amount is also limited. To be fully covered it is necessary to have an "all risks" policy which covers jewellery, antiques, cameras, and such items against loss by fire, burglary, larceny, accident, or misfortune. Some risks are still not included, such as loss or damage due to war.

Personal Liability Extension

8 In addition to the liability for accidental damage to property and bodily injury arising out of the business of farming, a farmer may be legally liable for such losses arising out of his personal actions not connected in any way with his business. For instance, while playing golf or any other sport or while attending race meetings or other pastime he may injure another person or damage property (for instance, golf ball through the windscreen of a car). For a small extra premium, cover for £10,000 may be included in a householder's policy or a farmer's liability policy, or a special policy may be arranged.

◆

Freedom-from-Hunger Campaign

THE Freedom-from-Hunger Campaign launched last year by FAO recognises a degree of poverty in less developed countries that in New Zealand can scarcely be imagined.

National action will be the heart of the campaign. Most of the projects will relate to such aims as increasing food production, improvements in nutritive quality, prevention of food losses, and increased effectiveness in distribution.

A special fund is being established by FAO to further the campaign, and member countries, organisations, foundations, and individuals are being asked to contribute. Countries have been requested to establish national campaign committees to ensure active participation and to raise funds.

Hunger and malnutrition are real and urgent problems in many countries and the post-war upsurge in the growth of population has intensified them.

The Freedom-from-Hunger Campaign recognises that adequate food for the world's population can be provided only by building up the agriculture of the less developed countries.

New Zealand is a staunch supporter of FAO and has contributed significantly to the prestige of the organisation.

Because New Zealand's agriculture is one of the most advanced and efficient in the world, by providing practical training and sharing of knowledge with others a most effective contribution to the Freedom-from-Hunger Campaign can be made.

An Afghan driver being taught to operate a tractor by a representative of FAO. A number of tractors are among the modern equipment being used for the development of a 10,000-acre seed farm for the production of standardised strains of cotton for Afghanistan.

MAKE YOUR OWN CURTAINS

[*Green and Hahn*

LAST month in the first part of this article on curtain making by Eleanor Couston, Home Science Instructor, Department of Agriculture, Christchurch, various types and styles of curtains and curtain materials were discussed. In this concluding part of her article Miss Couston describes the fixtures which are used for hanging curtains and gives details of curtain making and lining.

TYPES OF FIXTURES

VARIOUS types of fixtures are available for attaching curtains to windows and the type which is most suitable will depend partly on the weight of the curtains and partly on whether the curtains are to draw across the window or not.

Track and Runners

For draw-across curtains special fixtures consisting of a track and runners are the most satisfactory. The track, which can be cut to the required length, is fitted with stops and attached either to wall or ceiling by brackets. Special draw-up tape with pockets for the insertion of hooks is sewn to the back of the curtain. The hooks fasten into small rings which hang from the runners.

Rods and Rings

Rods and rings may be used for draw-across curtains and though less expensive, do not slide with quite the same ease as the track and runners. However, a simple drawstring arrangement which will facilitate the drawing of curtains hung by this type of fixture is shown on the next page. It can be used successfully to save the wear and tear on the curtain edges, which results from pulling them across by hand, or to make the upper tier of cafe curtains more accessible.

AB is the curtain. C and D are the ends of the cord. Allow a length of blind cord twice the length of the rod and enough to hang double at one side of the window.

Leaving one end of the cord (D) hanging, thread the other end (C) through the rings, following the numbers in the diagram at right in order and knotting the cord on to the centre rings. Let the end C hang down with end D. Attach a tassel or acorn-type blind cord fitting to each end of the cord.

When one end of the cord (D) is pulled the curtains are drawn apart and when the other end (C) is pulled they are drawn together.

Side curtains or glass curtains which are not required to draw across can be made with a casing through which a rod or dowelling is inserted. The rod is supported either on screw hooks or fitted into screw sockets.

Extension Wire

Extension wire is a simple type of fixture which may be used in kitchen or bathroom for light-weight curtains. The plastic-coated variety is best, as it will not rust. The wire is cut shorter than the window width to give tension and is fitted at either end with a screw hook which will fasten into a corresponding screw eye placed in the window frame.

MEASURING, CUTTING, AND SEWING

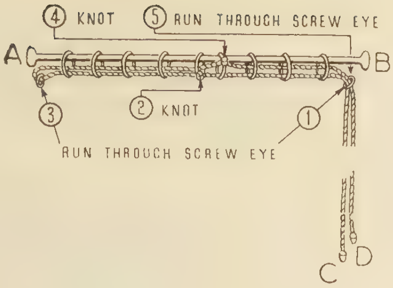
Place the curtain fixture in position before taking the measurements and calculate the length from the rail down. Measure each window separately, as sometimes windows which appear to be alike are not identical.

Cutting and Sewing Tips

Before cutting the material draw a thread, then cut on the thread line.

Remove the selvedges. The selvedges of most materials are more tightly woven than the rest of the fabric and unless they are removed, will cause the corners of the curtains to curl upward. After laundering, the selvedges will tighten up further. If the selvedges appear to be a similar weave to the fabric itself, notching it at intervals may be a sufficient precaution.

Where more than one width of material is required, first join the widths together, using the type of seam best suited to the fabric and matching designs where necessary.



Method of making a drawstring for curtains. Thread the cord following the numbers in order. Pull end D to open the curtains and end C to draw them together.

When stitching sheer curtains use a long stitch and a loose tension to prevent the hems from puckering.

When a casing is required allow two and a half times the diameter of the rod.

Glass Curtains (with Casing)

Hems for glass curtains are usually 2 to 2½ in. deep. In sheer materials hems are better made double so that the line of the raw edge does not show. The heading is usually 1 to 1¼ in. deep.

To calculate the amount of material required add to the length measurement:

2 in. for a 1 in. heading,
3 in. for a 1½ in. casing,
¼ in. for turn-in for the top hem,
4 in. for a 2 in. hem at the bottom,
1 in. to 2 in. per yard for shrinkage (unless the material is guaranteed pre-shrunk).

Stitch the side hems. These may be either narrow hems not more than ¼ in. wide or 1 in. hem at the centre and ½ in. finished width at the sides.

Make the top hems the depth of the casing plus the heading. Stitch back at ends.

Stitch again parallel to the hemstitching line to form the casing.

Turn up the lower hem and stitch back at ends.

The shrinkage allowance may be made into a tuck just under the casing on the wrong side or at both top and bottom hems. These tucks can then be let out if the curtains shrink.

Unlined Draperies

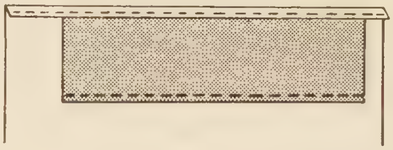
Take measurements from the rod or fixture down.

If a pelmet is being used, allow 1½ in. for the top hem and turning. If there is no pelmet, allow sufficient material for a 2½ to 3 in. heading.

Allow sufficient material for a lower hem which will be in proportion to the length of the curtains. The minimum allowance for the depth of the hem is 2½ in.

Allow ½ in. turnings at top and bottom.

Straighten the material if necessary. Remove selvedges. Cut all lengths on a drawn crosswise thread. Match the pattern in each length to the first one with the bottom of a repeat in the pattern at the bottom of the curtain.

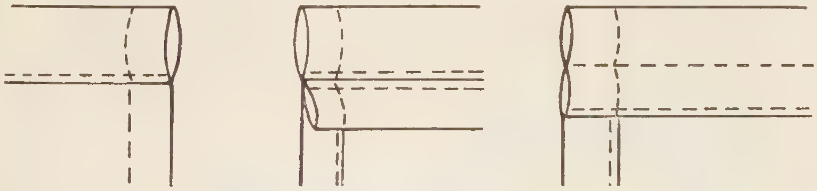


Curtain with stiffened heading.

If stiffening is to be used for the heading, place it along the top edge of the material on the wrong side to reach to the fold of the side hems. Turn the raw edge of the material down over the stiffening for about ¼ in. Stitch along the edge. Make another row of stitching along the other edge of the stiffening.

Make centre hem by turning in raw edge for ¼ in. and machining. Turn back 1 to 1½ in., pin, and slip stitch by hand.

Make side hems ½ to 1 in. in the same way. Turn down the heading



Left—Plain casing. Middle—To allow for shrinkage a tuck can be put under the casing. Right—Casing with a heading.

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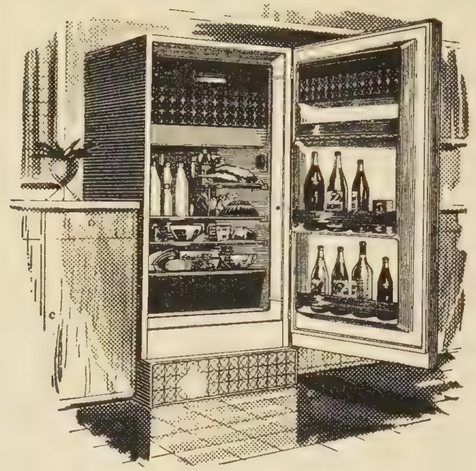

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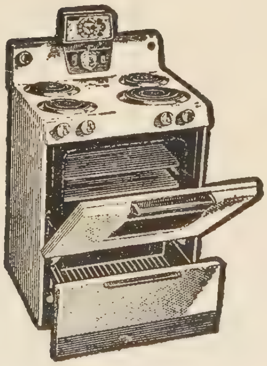

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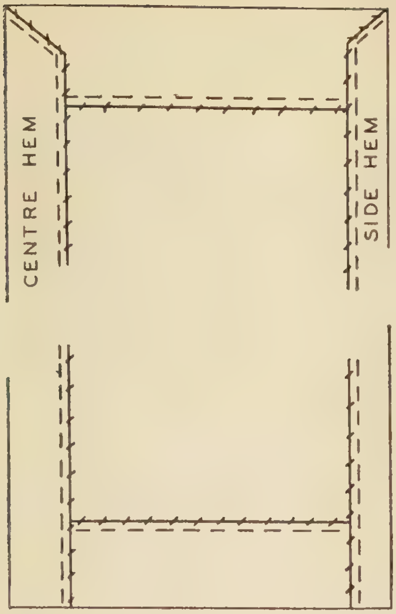


Unlined curtains.

and mitre the corners. Stitch the top hem by machine or by hand.

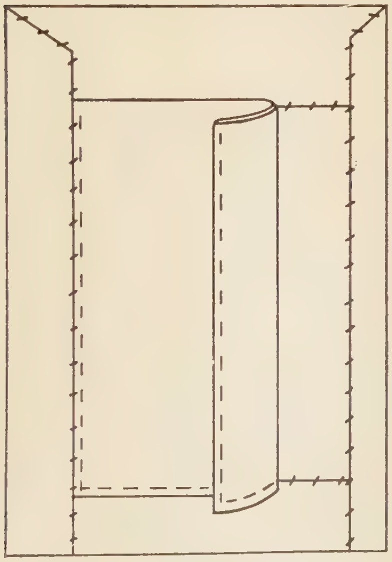
Turn up the lower hem and slip stitch by hand.

Finish at the top with pleats, draw up tape, or rings.

Lined Draperies

Lining material for draperies may be furnishing sateen, casement cloth, or unbleached calico. These should be pre-shrunk.

An alternative is wax lining material, which, because of its waxed finish, may be easily freed from dust by vacuuming. A lining material with a metallic coating on one side, which gives it good insulating properties, is used overseas, but is not at present readily available in New Zealand.



Loose lining.

Loose Lining

Where the lining is made separately and is hand stitched to the curtain at the sides it is called a loose lining. This method is the most suitable for heavy-weight fabrics and for full-length curtains.

Make the drapery the same way as for the unlined drapery.

Cut the lining to reach from the top hemline of the drapery to cover the lower hemline by 1 to 2 in. and wide enough to reach the stitching lines at the sides. Allow ¾ in. at each side for ¼ in. turnings and ½ in. hem.

Allow ½ in. turnings at the top and bottom and sufficient material for a 1 in. or 2 in. hem. The depth of the lining hem will depend on the depth of the drapery hem, 1 in. being adequate for short curtains with 2½ in. hems, but for long curtains with a deep hem, 2 in. is preferable. The stitching line of the lining hem should fall directly above the stitching line of the drapery hem.

Turn in the side hems and machine stitch. Turn up the lower hem and machine stitch. Turn in the allowance at the top of lining and press.

Slip stitch the lining to the drapery fabric at the top and catch the two together at intervals down the sides.

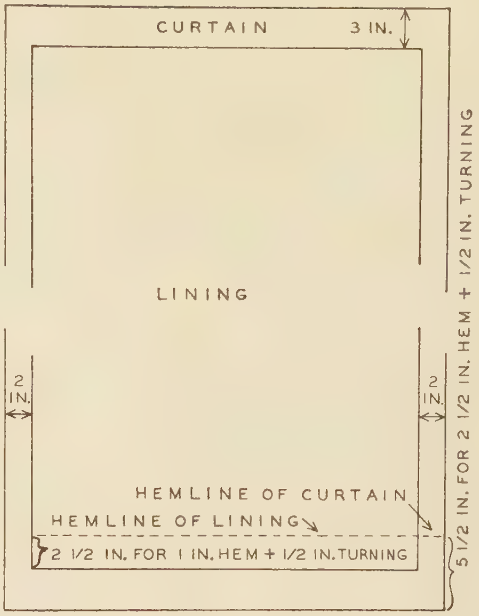
Leave the lower edge to hang loose.

To ensure that the lining and curtain material will hang together in the same folds they may be "locked" in the following way:

Lay the curtain material flat on the table right side down. Place the lining in position over it with the stitching line of the hem above the stitching line of the curtain hem. Fold both sides of the lining over to meet each other in the centre. Lock the fold of the lining to the curtain material with long, loose, invisible stitches. Repeat down both folds. Slip stitch the edges and tops of the curtain and lining together. Leave loose at the lower edge.

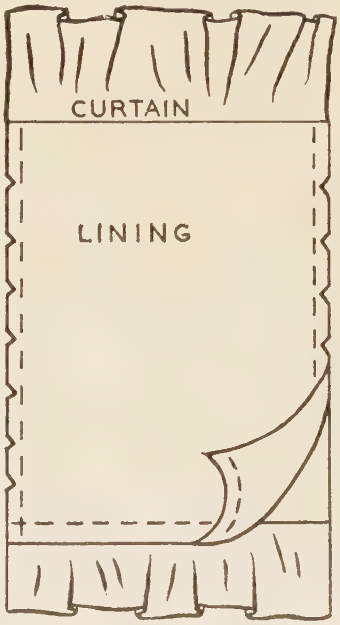
Bag Lining

Where the lining is machined at the sides to the curtain material it is called a bag lining. This method is suitable for short curtains, but both the curtain and the lining materials should be pre-shrunk.


CURTAIN
3 IN.
LINING
2 IN.
2 IN.
HEMLINE OF CURTAIN
HEMLINE OF LINING
2 1/2 IN. FOR 1 IN. HEM + 1/2 IN. TURNING
5 1/2 IN. FOR 2 1/2 IN. HEM + 1/2 IN. TURNING

Bag lining (1), showing measurements of the curtain and the lining material when the curtain has a 1½ in. heading and a 2½ in. hem.

(Continued at bottom of next page)



Bag lining (2), showing the lining stitched to the curtain fabric with the right sides together.

Dunks, Dips, and Spreads for Quick Savouries

By DAPHNE EILERS,
Home Science Instructor,
Department of Agriculture,
Dunedin

PREPARATION of savouries for parties is time consuming. An easy way round the problem is to serve the makings of the savouries on trays or hors d'oeuvres plates and leave the choice of mixtures to your guests.

AS bases for the savoury fillings, choose from the wide variety available of cocktail biscuits salted or plain or with cheese flavourings. Potato crisps have a contrasting texture that is particularly pleasing with the soft dunk type savoury mixture. Fried or toasted bread shapes and crisp celery pieces also make satisfactory savoury bases. Cubes of ham or luncheon meat can be skewered with a toothpick and dipped into relish or sauce to make tasty mouthfuls.

Dunks or dips should be of a soft consistency so that a small quantity can be scooped out of the bowl on the biscuit without need of a knife or plate.

Cheese Dunk

3 oz of cottage cheese
½ cup of cream or top milk
½ teaspoon of Worcestershire sauce
½ cup of chopped nuts or celery
⅛ teaspoon of salt
½ tablespoon of horse radish sauce

Add the milk or cream gradually to the cottage cheese and beat until smooth. Blend in the other ingredients.

Barbecue Dunk

3 oz of butter
1 tablespoon of tomato puree
2 tablespoons of brown sugar
2 teaspoons of prepared mustard
2 tablespoons of Worcestershire sauce
1 large onion, finely chopped
2 tablespoons of wine vinegar
½ cup of water
Pinch of salt

Melt the butter, add the onion, and saute gently. Add the rest of the ingredients and simmer gently until the onion is soft and the mixture reduced to a dropping consistency.

Quick Dips Using Sour Cream

Chopped shrimps, tomato sauce, Worcestershire sauce, and sour cream.

Diced stuffed olives, chopped celery, a little Worcestershire sauce, grated horse radish, and sour cream.

Chopped cooked meat, diced green pepper, grated horse radish, and sour cream.

Spreads

As the word "spread" implies, these are thicker in consistency and plates and knives for guests to use are needed.

Bacon, Nut, and Olive Spread

¼ lb of bacon cut into small pieces
¼ cup of chopped nuts
Mayonnaise
1 small bottle of stuffed olives, chopped (about ½ cup)

Fry the bacon pieces until crisp. Mix with the nuts and olives and add mayonnaise a little at a time until all are nicely blended.

Fish Spread

1 cup of flaked salmon or crayfish
3 tablespoons of sweet pickle (chopped)
Or
3 tablespoons of chutney
1 teaspoon of salt and a shake of pepper
4 tablespoons of mayonnaise

Combine all the ingredients and mix until well blended.

Saveloy Spread

6 saveloys
½ teaspoon of prepared mustard
Dash of Worcestershire sauce
1 tablespoon of tomato sauce
4 tablespoons of mayonnaise
Salt and pepper to taste

Boil the saveloys, skin them, and mince or pound them to a paste. Work the other ingredients into the paste or combine them in an electric blender. More or less mayonnaise may be needed depending on the consistency of the saveloys.

Make Your Own Curtains

(Continued from page 293)

Decide on suitable depths to allow both the heading and hem and measure the length of curtain material required. Measure the length from the rod to the lower edge of the curtain and add ½ in. turnings at the top and bottom, twice the depth of heading, and the depth of lower hem.

Straighten the curtain material, cut, and remove the selvedges as for unlined drapery.

Remove the selvedges from the lining material and cut 4 in. narrower than the curtain material. This allows for a 1 in. turn-back of curtain material at the centre and the side.

Cut the lining material 5 to 8 in. shorter than the curtain material. This measurement will vary according to the depths of the heading and hem of the curtain material. Allow 1 in. hem for the lining.

Calculate the difference the lining should be cut shorter by adding the heading depth to the hem depth minus the lining hem depth and doubling it. For example, if the heading is 1½ in., the hem depth is 2½ in., and the lining hem depth is 1 in., the total difference will be 6 in. (1½ + 2½ — 1 = 3, 3 × 2 = 6).

Turn up lower hem in the curtain material and slip stitch by hand.

Turn up 1 in. hem on the lower edge of the lining material and machine stitch.

Turn up ½ in. at the top of the lining material and baste.

Place the lining on the curtain material, right sides together, so that the stitching lines of both lower hems match.

Machine along the side edges and notch the seams every 4 or 5 in. Press the seams open.

Turn curtains right sides out, adjusting the curtain fabric so that 1 in. is turned back at both the centre and wall edges, and press well. Machine or hand stitch the lining to the top heading.

Mitre the top corners and neaten by hand stitching. Hand stitch the side hems of the curtain at the base.

The lower edge of the lining is not attached to the curtain material.

Weighting

To improve the hang of heavy curtains weights may be used. Make a small pocket of the curtain fabric and insert a lead weight. Stitch this invisibly into the corners of the curtain hem.

◆

[*Elliott*

▲ LEFT: A pleasant shaded area of a garden where tree ferns and native trees blend with azaleas.
RIGHT: This shaded corner has a high canopy of trees and is underplanted with tall and dwarf shrubs, ferns, and herbaceous plants.

FLOWER GARDEN

PLANTS FOR SHADY POSITIONS

THOUGH a bright and colourful garden can be made with annuals, gardeners are now planting more trees and shrubs, as they find these are satisfactory and involve less work. It is often desirable to inter-plant or under-plant trees and shrubs to produce a more satisfying garden.

By J. P. SALINGER,
Horticultural Advisory Officer
(Ornamentals),
Department of Agriculture,
Wellington

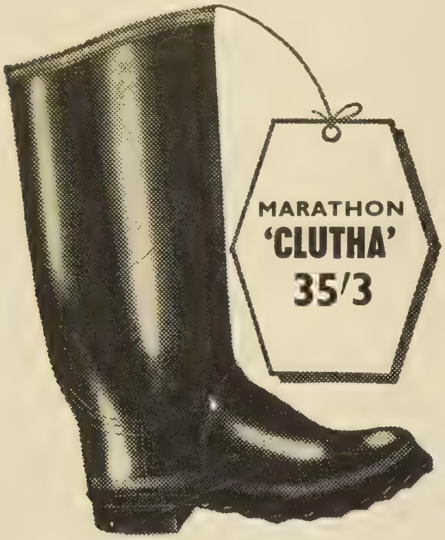
MOST parts of New Zealand enjoy plentiful sunshine in summer, and it is not difficult to make a bright display in the open parts of the garden. A shaded area contrasts with that in sunshine, and shade can be both pleasant and beneficial. The shaded area also allows the gardener to extend the range of plants he can grow.

Especially in hilly areas, some parts of the garden may be in natural shade, such as from slope of the ground, tall trees, or the house, whereby one part of the house faces south and is therefore shaded for most of the year.

Shaded areas are usually moist, but under tall evergreen trees or under the eaves of a house or similar buildings they may be quite dry for long periods of the year, and different plants will be required for moist soil and dry soil.

Natural Shade

Many new homes and gardens are being made either in areas of native bush or in subdivisions of large old gardens. As far as possible good existing specimens of trees and shrubs should be retained, and these should be reserved from the first, so that the house and garden can be planned round them. Much can be done by careful pruning of the larger trees in which the lower branches and any dead or diseased wood are removed. If the trees are near the house, the branches should be removed to the level of the eaves.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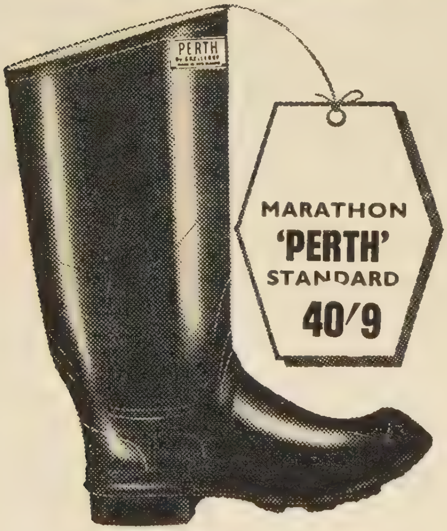
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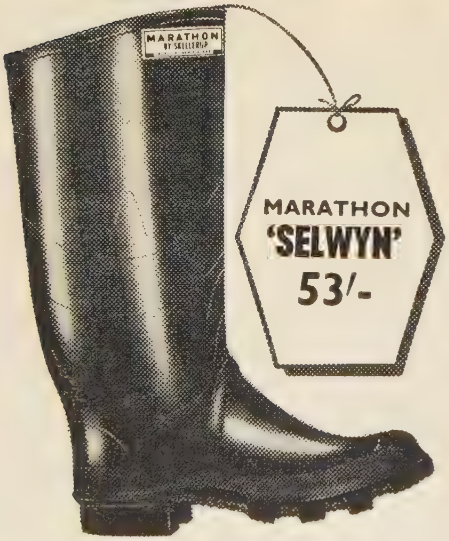
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MADE IN N.Z

Most areas of native bush consist mainly of secondary regrowth of shrubs such as manuka, five finger, or pepper tree. This growth is often too thick to make a satisfactory garden, so the small shrubs should be cut out, leaving good individual specimens at intervals; it should then be possible to plant other ornamental trees and shrubs in the spaces left.

Planned Shade

Where it is intended to make a definitely shaded part of the garden, planting must be carefully selected. It can be divided into three portions—overhead canopy of tall trees; the intermediate area planted with shade-loving shrubs and perennials; and dwarf plants to cover the ground. For the overhead canopy it is necessary to be particularly selective. The trees chosen should have a light, open foliage and not a dense cover of leaves, and their root systems should be fibrous and not too widespread. Most deciduous trees are best suited for this purpose. Only the less vigorous ornamental conifers should be used, as timber type conifers will provide too dense a shade and their root systems are too aggressive.

Suitable deciduous trees are:
Acer spp. (maple)
Betula spp. (birch)
Fraxinus excelsior aurea (ash)
Liquidambar
Parrotia persica
Prunus cerasus (cherry). Cool districts
Quercus coccinea (scarlet oak). Cool districts
Q. palustris (pin oak)
Sophora tetraptera (kowhai)
Taxodium distichum (swamp cypress)

Evergreen trees which can be combined with these are:
Agathis australis (kauri)
Dacrydium cupressinum (rimu)
Ilex aquifolium (holly)
Lagunaria patersonii. Frost free areas

Such trees should be set out not closer than 12 ft apart, and though this may appear to be a wide distance in the early stages, the trees will soon fill the area.

A few smaller trees may also be planted between the taller ones, especially those which require protection from wind or intense sunlight. Suitable trees for this position are:
Amelanchier canadensis
Cornus spp.
Halesia corallina
Sorbus aucuparia (rowan)

Plants for intermediate planting include rhododendrons, evergreen azaleas, and similar plants of the *Erica* family, camellias, daphne, fatshedera, and hedychium. In the early stages these plants will require watering in dry weather, and mulching with moist materials such as well rotted sawdust, spent hops, bush leaf mould, or peat. In later years the natural leaf fall from the trees should provide an adequate

▲ Ivy and aucuba can be grown in the dense shade beneath a large pohutukawa tree, while hydrangeas and dahlias flourish in its lighter shade.

▼ Old established trees have been retained in this garden and give welcome shade in summer. The lower branches have been pruned off to give light and air and allow unimpeded movement in the garden.

[*Sparrow*

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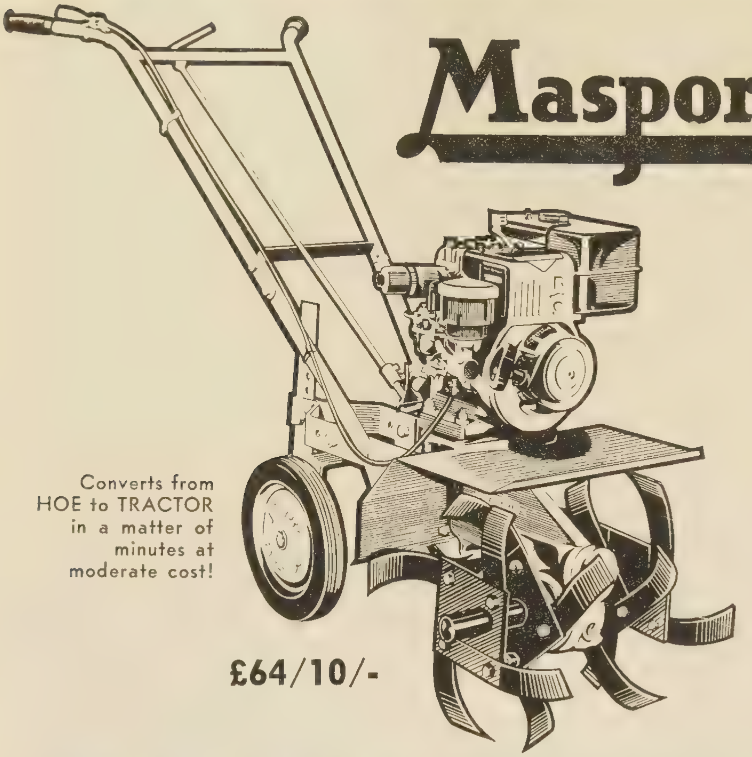

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mulch for these plants, and it is better to allow the leaves to lie and rot than to rake them up and compost them, though at the initial leaf fall they may tend to blow about.

Many bulbs and perennials can be planted among these shrubs, suitable ones being aconites, babiana, bluebells, clivia, daffodils, erythronium, lilies, snowdrops, and trilliums. Most of these come from the cooler parts of the Northern Hemisphere, South African bulbs, in general, preferring a more open position in the garden and so are unsuited for shaded areas.

These plants will also benefit from the mulching applied originally, or the subsequent natural mulching.

Toward the edge of such areas dwarf perennials are suitable, and they include:
Anemone hybrida (*A. japonica*)
Aquilegia
Bergenia
Bletilla
Hellebores
Hosta
Myosotidium hortensia
Lily of the valley
Omphalodes cappodocia

Primroses in various colours make a delightful display in early spring. Annuals such as forget-me-not and *Primula malacoides* also make a good ground cover.

As a shaded area is likely to be of some depth, paths are required through this part of the garden, and initially these can be sown down in grass and mown occasionally.

Probably the most attractive form of shaded garden can be made where a stream can be formed. This provides an opportunity to grow a wide variety of plants which enjoy really moist soil.

Some plants can be set out directly on the banks and adjacent to the water; suitable plants are the double kingcup and trollius. Elsewhere small beds should be made just above the highest water level. In these the bog primulas such as *Primula bulleyana*, *P. denticulata*, *P. japonica*, and *P. pulverulenta* will flourish, and make an excellent display in late spring and summer.

Other plants which prefer shaded moist conditions are the non-suckering ornamental bamboos and *Gunnera manicata*.

Permanently Shaded Areas

Areas which are permanently shaded *cerealella*) is a serious pest of maize, attractive if correctly planted. For minimum upkeep hydrangeas and fuchsias are probably the easiest plants to grow, but where it is not intended to have such solid plantings, many varieties of ferns can be planted, or will possibly develop naturally. Ferns in general, though not colourful, provide a delightful variety of leaf form and texture, and could be used more widely in shady, damp positions. If associated with more colourful plants, such as tuberous begonias and the perennials listed on this page, the area will be of great interest throughout the year.

Agapanthus are excellent for stabilising shady banks; they flourish in both damp and dry soil.

Some plants are quite tolerant of very dense shade and are also quite hardy; they are mostly berried shrubs and include aucuba, *Euphorbia wulfenii*, *Mahonia aquifolium*, nandina, ruscus, and *Sarcocca ruscifolia*.

Dry areas which are shaded are somewhat more difficult to furnish with plants, but in warm areas they can be made into a garden of cacti and succulents, especially if the particular position is partially landscaped by the use of suitable small rocks, shingle, and boulders and surfaced with fine gravel. The whole area will appear as a cactus garden in miniature. Where a minimum of maintenance is required, permanent plantings of ivy leaf geraniums, pelargoniums, and agapanthus can be set out, and apart from removing dead heads and controlling pests and diseases, little additional work will be required.

Suitable shrubs for these areas include hypericum, mahonia, and dwarf manukas.

In hillside gardens there are often steep slopes facing south which are difficult to plant and keep covered. One method is to sow the bank down to grass and keep the grass cut to about 4 in.

The following plants can then be set out in pockets cut into the bank: ferns, trailing rosemary, arctotis, variegated ivy, hebes, variegated pittosporums, ornamental flaxes, and drooping varieties of fuchsias.

Where it is preferred to keep the bank free of plants, a selection of climbing plants can be planted at the base and trained to grow up the slope. A few may also be planted at the top and trailed down, but the majority of plants grow upward rather than downward. Self climbing or clinging plants include the ivies in variety, Virginian creeper, *Cobaea scandens*, and in warmer areas, *Heeria rosea* and *Fiscus pumila*.

As the New Zealand climate varies greatly, even within a small area, interesting public or home gardens in the area should be visited to see what plants flourish in shady positions. By careful thought and planning the shaded part of the garden need not be less attractive than the flower bed or rose garden.

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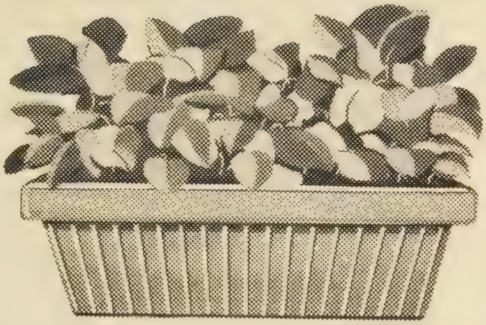

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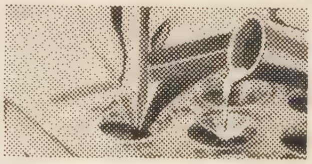

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3'11

P.5

Garden Work in October

Seeds of all kinds may be sown as soon as the soil is friable and warm enough. In the colder districts sowings made under glass may be planted out at the end of this month or in early November.

Seeds of herbaceous perennials and of shrubs and bulbs may take a long time to germinate, so they should if possible be sown in sterilised soil to eliminate weeds. Sow in boxes or frames or in specially prepared raised borders in a sheltered position. Mix small seeds with sand or dry soil to facilitate thin sowing, and dust with a pinch of copper oxychloride or thiram as a protection against disease. Do not cover too deeply. Label carefully.

By JOY WATKINS,
Horticultural Advisory Officer,
Department of Agriculture,
Auckland

Annuals may be sown where they are to flower. Break up the soil with a fork, incorporating a balanced fertiliser (3 parts of blood and bone, 2 parts of superphosphate, and 1 part of sulphate of potash) at 4 oz to the square yard. If the soil is very poor and tends to dry out in summer, fork into the topsoil some well rotted compost. Allow at least two weeks for the soil to settle again before sowing, but if this is not possible, tread the ground to firm it thoroughly and then rake to a fine tilth and sow.

Packets of mixed annuals that are available give a good show with little trouble. Alternatively, a large range of annuals is procurable, and these may be sown in groups in an annual border or to fill gaps in other flower borders.

The seed may be broadcast and then raked in, though this can cause difficulties when weeding in the seedling stage. A better method is to sow in shallow curving drills about 6 in. apart where a group is required. As soon as the seedlings are through it is possible to cultivate between the rows.

Plant out seedlings from earlier sowings which were made under glass or in a sheltered border, preparing the ground in the same way as for sowing.

Bedding Plants

Remove spring bedding plants as soon as possible, and prepare the ground as for sowing annuals. Flowers and foliage plants may be bought to provide a show in summer and autumn. Choose sturdy plants with good root systems. Well grown plants may be more expensive, but they are more satisfactory.

This rose is suitable for garden display, as lateral buds continue to develop when the first flower is over. A larger single flower on a long stem is more suitable for cutting, and could have been produced by rubbing out the side buds when they were small.

If plants have been raised in the home garden, water thoroughly the evening before transplanting. Shelter from wind and sun is beneficial for the first few days if this is practicable. During the first month water as necessary to keep the plants growing rapidly.

Standard geranium, fuchsia, heliotrope, or pillars of the climbing quamoclit or Morning Glory give an interesting variation in height of the bedding scheme.

Foliage plants such as kochia, coleus, variegated pelargoniums, irisene, and alternanthera are as important as the flowers.

Routine

Hoe and weed borders frequently, pulling out any weeds which get into the centres of herbaceous plants and shrubs so that they do not become established there.

Water plants as necessary, particularly those which have been planted recently.

Watch for pests and diseases and spray as necessary.

Thin out the shoots of herbaceous plants (delphinium, shasta daisy, lupin, michaelmas daisy, etc.), so that the remaining stems are strong and well spaced. Stake tall varieties as inconspicuously as possible.

Take cuttings of the young, healthy shoots of good varieties when they are about 4 in. long. Cut the stem below ground, remove lower leaves, and insert in a sandy mixture in a frame. Water in.

Apply weedkiller to paths before the weeds are large.

Shrubs

Remove and burn any dead or diseased branches from roses and other shrubs and trees, cutting back to a healthy leaf or bud.

Rub out suckers on the main stem of standard trees and shrubs while they are still young and soft. Suckers growing from below ground level should be carefully exposed and then wrenched out at their point of origin.

Slim Anna says;

"Summer's for the slim,
the figure-proud.
Will you be basking in
admiration as well as
sunshine?
NOW is when you do
something about it."

ORANGES are your *natural* ally. Eat them whole between meals to restrict your appetite for high-calorie, fat-forming foods. That way they're rich with protective and tonic virtues too. The juice gives you vital Vitamin C. The succulent "flesh" provides proto-pectins to improve digestion, inositol to protect the liver from harmful fatty deposits, bio-flavonoids to keep the tiny blood vessels elastic and youthful and Pro-vitamin A for eye and skin health.

Remove green growth on variegated shrubs in the same way.

Cut off dead flower heads.

Weed and water newly planted shrubs.

Now is the time to prune evergreens to shape, using secateurs. The new shoots will quickly grow out to hide the cut ends of branches.

Pinch out the tips of strong-growing shoots to encourage branching. Many shrubs, such as fuchsia, buddleia, tibouchina (lassiandra), and poinsettia, which tend to become straggly, respond to this treatment.

Carnations

Plant out rooted cuttings of carnations in a sunny position where they are to flower. Carnation beds must be carefully prepared to promote vigorous growth of the young plants, particularly on badly drained soil. First attend to the drainage, inserting tile, scoria, or gravel drains, or raising the level of the bed slightly.

If carnations have been grown in the soil recently, it is advisable to sterilise with formaldehyde, vapam, or mylone, using the last two if weeds as well as disease are a problem. Dilute the formaldehyde at 1 gallon to 49 gallons of water and apply at about 3 gallons to the square yard to drench the soil. Cover with damp sacks for a few days; then after about three weeks fork the ground to release the fumes. Do not plant until all traces of fumes have gone.

Vapam can be used in a similar manner, the manufacturers' recommendations being followed carefully. If oxalis is present, the material should be used at double strength. Soil sterilants penetrate better if the soil is thoroughly cultivated before treatment.

Carnations respond to liming, so if the soil is at all acid apply agricultural lime at about 1 lb to the square yard before planting, preferably immediately after the winter digging.

A well balanced general fertiliser, needed to produce good blooms, can be made by mixing 4 lb of bonedust, 3 lb of dried blood, and 3 lb of sulphate of potash. This is worked into the topsoil at 4 oz to the square yard before planting.

Plant only strong, healthy plants of good varieties, as these are no more trouble to look after and give a much more satisfactory return in flowers or garden decoration than weak plants or poor varieties.

Lawns

In Auckland and Northland sow paspalum seed on ground prepared as detailed last month. The seed is large and germination poor, so the rate of sowing must be heavy, about 3 oz to the square yard. In the colder districts complete the sowing of fine-grass lawns as soon as possible so that the grass is well established before the weather becomes hot and dry.

Molucella laevis, commonly called shell flower or Bells of Ireland, is an excellent annual cut flower which should be sown in October.

House Plants

Allow cyclamen which have finished flowering to dry off gradually by watering less frequently. During summer they can be stored in their pots by laying these on their sides.

Pot up house plants as necessary. Shallow clay or plastic pots are suitable and more attractive than deep pots for many plants such as African violet, gloxinia, Begonia Rex, and maranta. When only a few plants are grown, suitable potting mixtures may be bought; otherwise a mixture can be made from sieved rotted turf to which sand or scoria and peat or leaf mould have been added to produce a free-draining, friable mixture. To each bushel (apple case) of soil mixture 1½ oz of hydrated lime and 4 oz of a balanced fertiliser mixture should be added.

Plants which have filled their pots with roots and are not repotted must be fed every 10 days from now until March with very weak liquid manure or a proprietary foliar feed. If the soil on the surface of the pot is caked and green, it should be removed carefully with a pointed stick or label so that roots are not damaged and replaced with fresh soil mixture.

As plants are now growing well, take leaf or stem cuttings as required and place in a sandy mixture in a warm, humid atmosphere to root.

Floral Decorations

Cut tulips as soon as the colour is well developed. If stems are not stiff, remember to lime the bed before planting next season. Cut flowers with weak stems may be stiffened by rolling the bunch tightly in newspaper and placing in a deep container of cold water overnight. Tulip flowers can be used at the focal point of arrangements if the petals are gently curved backward; they will stay in this position. Stems of tulips arranged in deep water will bend and "arrange" themselves. They last longer in shallow water.

Roses should be cut with long stems to encourage the growth of strong shoots which will flower later in the season. Strip lower leaves and thorns from the stem, slit the base upward for about an inch, and scrape the green bark from the surface at the bottom before placing in deep cold water overnight. With this treatment they will last longest. Cut the flower when one or two petals are unfurling from the bud. If cut when too young, they will not open.

Cut and treat lilac like roses, but remove all leaves from the flowering stems. Sprays of leaves may be added separately to the arrangement.

Branches of foliage with soft young tips are often very colourful, but are most likely to wilt when cut, as the hard woody old stem is unable to absorb water fast enough. Choose stems with enough length of new growth to use alone without any of the hard older portion, and harden thoroughly in deep water before arranging.

Sow seeds of annuals which provide flowers, foliage, or fruit for decorations later, such as the "everlasting" flowers humea, rhodanthe, helichrysum, gomphrena, also Bells of Ireland (*Molucella laevis*), ornamental gourds, and the foliage plants variegated kale, ornamental beet, and *Euphorbia marginata*.

Make this Skirt from Your Old Coat

By A. GARDNER

A FITTING coat with a gored skirt has no place in the world of fashion today. Is there one hanging in your wardrobe? With very little effort it can be made into an attractive skirt.

FOLLOW these instructions and you will be more than pleased with the finished result.

Remove the lining. Mark the waist of the coat with large tacking stitches (diagram A). Cut along the tacking stitches, removing the skirt from the top of the coat (diagram B). Undo the hems.

The overlap necessary in the front for buttoning the coat is not needed in the skirt and is made into the front seam. To do this fold the skirt in half lengthwise at the centre back, wrong side out, with the side seams matching and the front edges together. Starting at the fold at the centre back, mark half your waist measurement and tack down the front of the skirt at this mark. Make sure the coat buttonholes are not included in this tacking. Leaving a seam allowance, cut off the extra material (diagram C).

Open the left side seam 6 in. for the zip. Fit the skirt, checking the hip measurement. Machine the centre front seam and press with a steam iron or a hot iron and a damp cloth.

Make a waistband with a strip of the surplus material cut from the centre front. Use the side without the buttonholes. Make the length of the waistband your waist measurement plus 1½ in. for the overlap at the side plus an allowance for turnings. The width you make it should be double the finished width you require, allowing for turnings, or if you cannot get this out of the strip of material you have, a false back may be made out of an odd piece of suitable material from your scrap box.

Sew the zip in the left side opening. Sew the waistband on to the skirt with the overlap on the front side of the zip opening. Make a buttonhole on the overlap and sew a button on the band on the other side of the zip, adjusting the band to fit your waist.

Take up the hem and give the finished skirt a good press all over with a steam iron or a hot iron and a damp cloth.

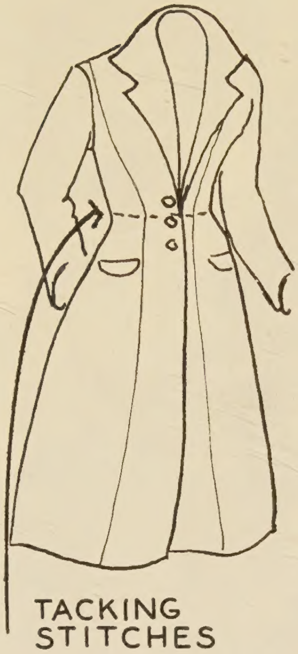


Diagram A.

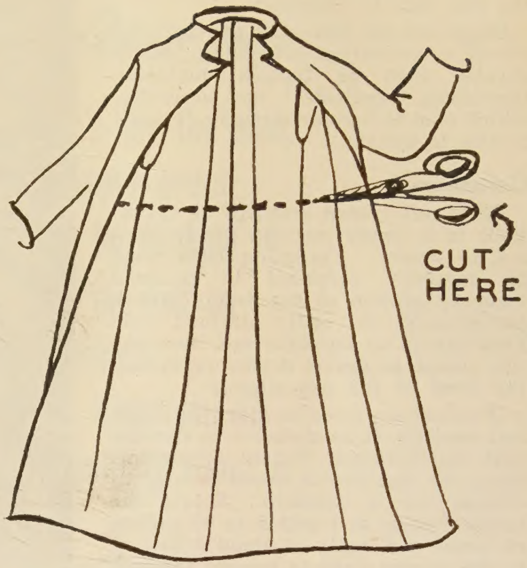


Diagram B.

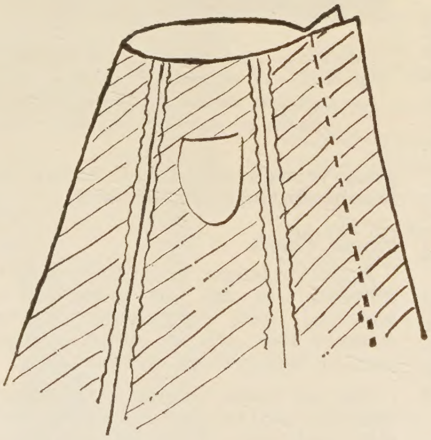
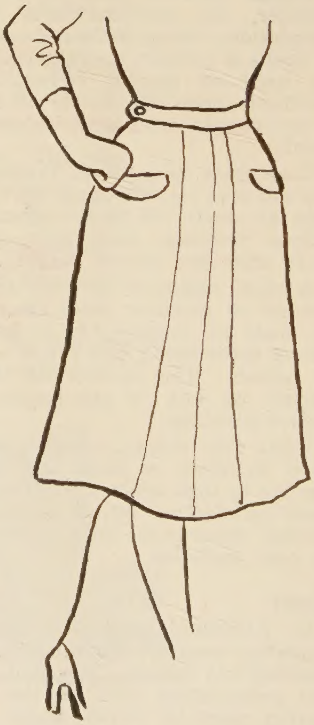


Diagram C.



Finished skirt.

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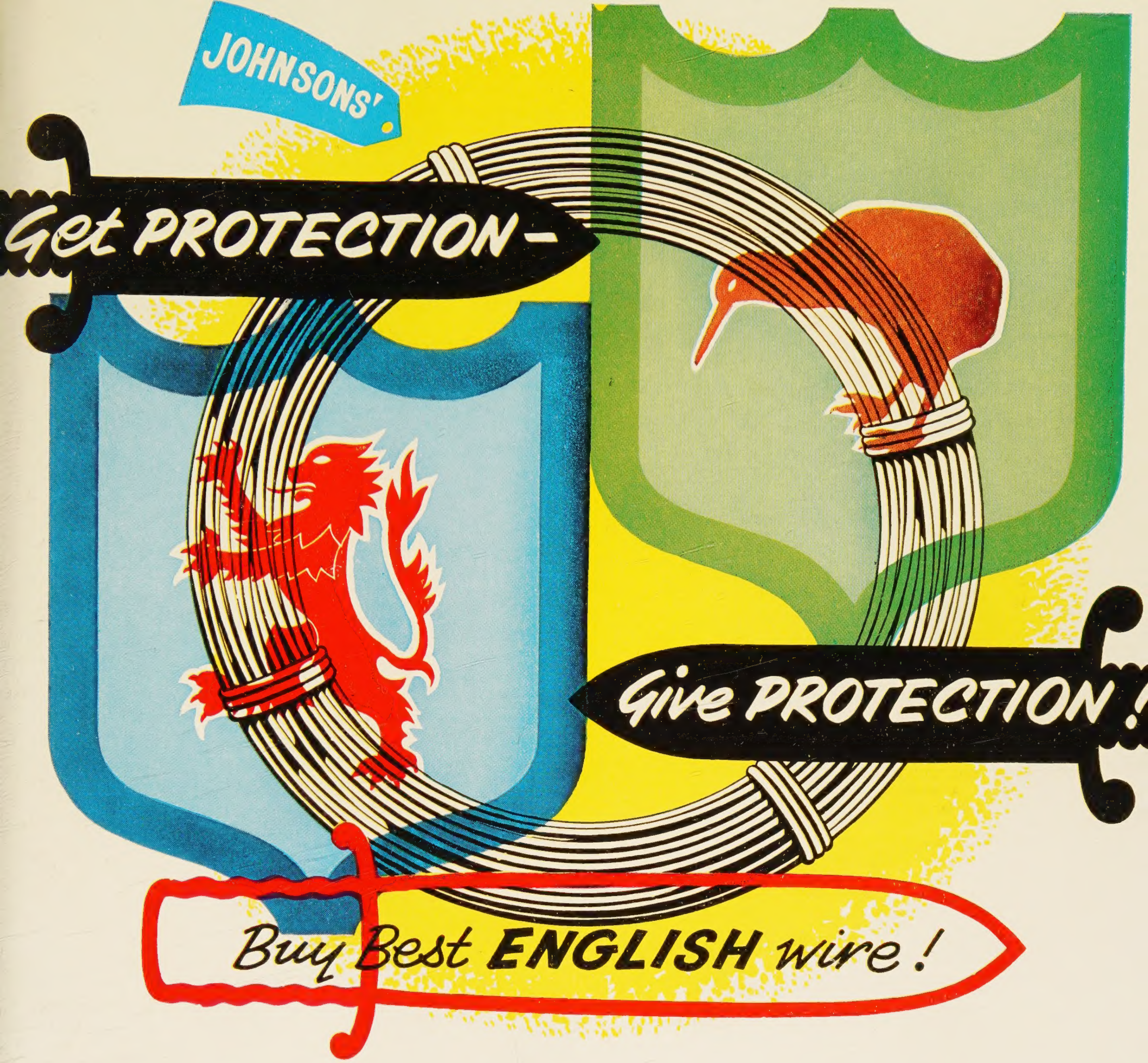
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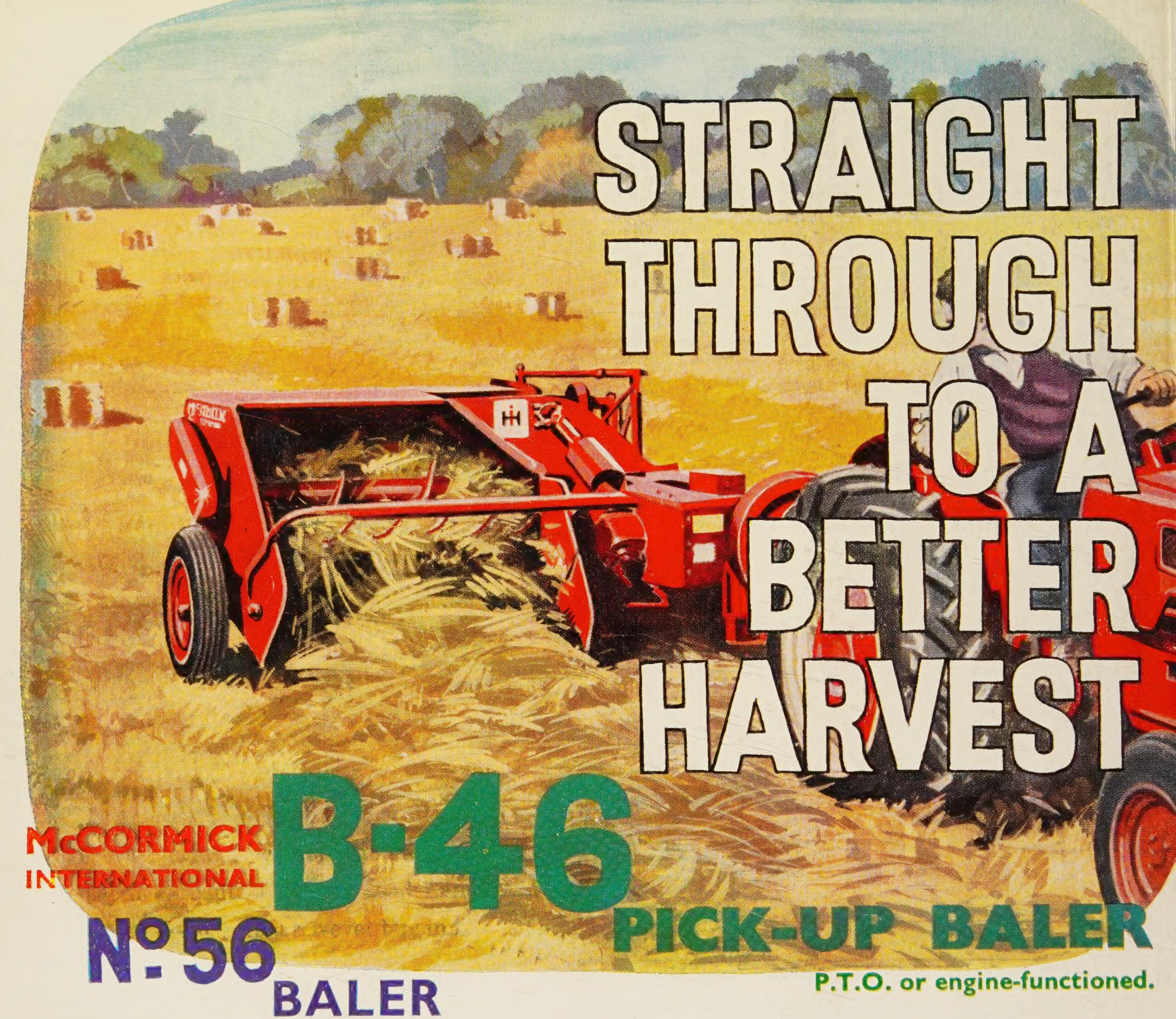

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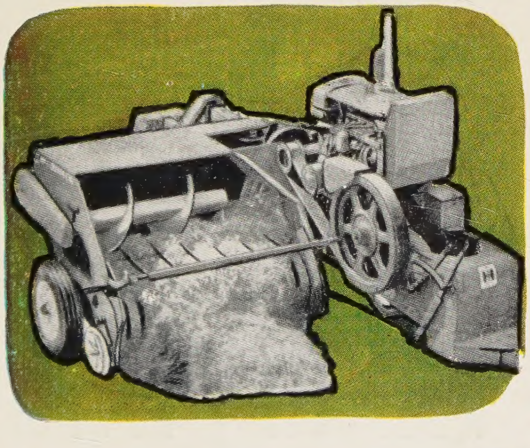

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